GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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Editorial Notes.

No Cause for Alarm—The Gas Poisoning Committee's Reassuring Report.

PUBLISHED in to-day's "JOURNAL" is the greater part of the Report of the Departmental Committee appointed by the Board of Trade "to consider the increase during "recent years in the number of deaths ascribed to poison-"ing by coal gas supplied for domestic purposes, and to "make recommendations as to any measures relating to "the production and use of gas for domestic purposes "which might be taken with a view to diminishing the "number of such deaths." A full report of the evidence before the Committee appeared in our columns during the course of the inquiry; and this will doubtless be a valuable source of reference in conjunction with the present findings.

These findings, we think all our readers will agree, are highly satisfactory, as being recognition not only of the great services of the use of gas to the community, but of the "service first" principles which characterize the internal organization of our industry. It is, we suggest, because of appreciation of "the economic and social benefits which follow a supply of cheap gas," and because our house is in order, that the Committee states there exists no cause for alarm; believes that no general prohibition or limitation should be placed upon the supply of carbon monoxide in gas at the present time; emphasizes the relatively small number of fatal accidents caused by gas compared with the large number of people supplied; and agrees that the addition to gas of substances designed to act as irritants, or to give gas a distinctive penetrating odour not now associated with coal gas, is neither desirable nor necessary. On more than one occasion we have stated that suicide by gas poisoning hinges on the "will to die," not on the means to die. As Dr. Ingleby Oddie, the Coroner for Westminster, said in evidence, "people who have made up their minds to kill themselves will do so somehow, for there are always trains, rivers, lakes, windows, 'Lysol,' and so on." The report records the view of Sir Maurice Craig that, from a medical standpoint, it has always been obvious that the will to die is the primary matter, and that the mode selected to obtain this end is either what appeals to the individual, or not infrequently some means referred to in the newspapers during the recent period before the suicidal act.

The Committee make seven recommendations; these are set out in later columns, and all are calculated to assist in enhancing the benefits of gas to supplier and consumer and the community generally. Among these recommendations is the setting-up of a central body, consisting of representatives of the various branches of the gas industry, and of representatives of manufacturers of gas pipes, apparatus, and fittings, to institute research into the means of rendering gas non-toxic, and generally of improving the safety and efficiency of the apparatus used in the distribution and supply of gas. The information obtained should be made available, at frequent intervals, for the use of individual gas undertakings and makers of apparatus. Another recommendation is to the effect that voluntary inspection of consumers' appliances should be undertaken generally by gas undertakings, that consumers should be warned of unsafe or improperly ventilated apparatus, and, if they refuse to act on warnings of this kind, steps should be taken to empower the undertaking to cut off the supply until the danger is removed. Finally, we draw attention to part of a further recommendation—that steps should be taken, by by-law or otherwise, to provide that geysers shall be properly fixed and adjusted, and that both the apparatus and the room in which it is fixed shall be adequately ventilated. It should be made unlawful, it is stated, to instal or maintain a geyser without a proper flue.

Meeting New Conditions.

No industry can really be termed "old," which is continually modernizing its methods to meet changing conditions. That is the case with the gas industry; and it is just this circumstance which removes from it all the traditional disadvantages of age, while leaving to it all the undoubted advantages of experience. These changing conditions were the first of a series of important problems discussed by Dr. Charles Carpenter in his address to the proprietors as President of the South Metropolitan Gas Company; and though to some extent they had reference to the special circumstances of that undertaking, they were for a great part of general application.

On a journey by road last Friday from Birmingham to the British Industries Fair at Castle Bromwich, the generously planned housing estates were noted; and this is the sort of thing which is going on—though perhaps not usually on so large a scale—all over the country. The laying out of such estates, as Dr. Carpenter pointed out, involves a much larger area of vacant land per unit of inhabitant than that ruling generally all over London—and the same argument applies to other towns. While the benefits which these improved housing conditions will confer upon the community are great beyond measure, they have the definite effect upon gas undertakings of increasing the cost of service; and as the increase in the number of consumers during the past year in the case of the South Metropolitan Gas Company has been almost entirely the result of building activities of this character, it follows that the new consumers will be less profitable than the older ones, since the capital costs for mains and services per therm sold must be higher. Those who are interested in gas undertakings will, when studying accounts, bear in mind Dr. Carpenter's remark that these

new consumers cost more to supply than did the older ones. It is a striking example of changing conditions. Excellent progress is being made with the supply of gas to housing estates; and we hope to hear of more, and still more, successes in this direction.

Another changing condition—changing not because of any alteration in the basic condition, but because of variation in the purposes for which gas is used—referred to at the South Metropolitan meeting was the fluctuation in the demand for gas in accordance with widely differing climatic conditions. No one needs to be reminded of the abnormally cold spell of weather in the early part of last year, or of the entirely successful manner in which the gas industry met the situation that thus presented itself. Phenomenal demands were the order of the day. In the case of the South Metropolitan Company, during the first two months of the year they had to meet a considerable increase in the demand for gas, averaging 13 p.ct., and rising upon one occasion to nearly 39 p.ct. This of itself was a sufficient tax on resources; but the position becomes more complicated when one reflects upon the mildness of the winter season through which we are now passing. As the result of this, the Company experienced an actual reduction during the last two months of the year in the quantity of gas consumed, amounting to over 3 p.ct.—and this notwithstanding the increase in the number of consumers. Lighting is a seasonal load, and cooking should be a fairly regular one, except for a tendency to select more hot meals in cold weather; but when it comes to heating, for which gas is in an ever-increasing number of cases being used, climatic conditions are the sole factor. The best method of meeting these fluctuations must to a large extent depend upon individual circumstances; and Dr. Carpenter's closely reasoned statement seems to point, in his own case, to a considerable increase in gas storage accommodation being the best solution of the problem, even though, as a purely economic project, there may not be much in the suggestion. In addition to enabling the Company successfully to cope with wide fluctuations in demand, the adoption of this scheme would have other advantages to which the industry rightly attaches importance. It would, in the President's own words, "mean that we could employ "a greater number of hands in coal carbonizing during "the week, with a proportional reduction in Sunday "labour; and, as a measure for relieving unemployment "in some degree, much more could be said in its favour "than for many other proposals for dealing with this "knotty problem."

These are only two of the matters discussed by Dr. Carpenter. Reference must be made to one other—the Coal Mines Bill, the situation created by which he declared to be the most serious of all the problems facing the gas industry. With regard to the suggestion that gas undertakings have been in the habit of buying coal at below cost price, he said that, so far as London is concerned, such allegations are ill-founded. After twenty-five years' association with the purchase of gas coal, Dr. Carpenter stated unhesitatingly that the South Metropolitan Gas Company has never been a member of any buying ring, but has always bargained independently for its supplies of coal.

Prospects in the East.

POSSIBLY the most striking subject to which Mr. W. G. Bradshaw was able to refer in his speech as Chairman at the annual meeting of the Commercial Gas Company was the welcome reduction which has taken place in the excessive rates that have driven manufactures and industries from the district. These excessive rates have been the cause in the Company's area of a degree of unemployment that has rendered it obligatory on the working classes to stint themselves in every article of domestic consumption, including gas. It is confidently anticipated that there will be still further reductions in these rates, and, as the Chairman said, that the East End, with the undeniable advantages for industrial and commercial purposes of its situation close to the business part of London and the docks, and the convenience which it offers of rail and water carriage, will again attract new industries and manufactures, and tempt back those which were driven away.

Could anything show more clearly than these words the folly of excessive rates, which force local industries to remove to other areas? As a matter of fact, the subject of both local and Imperial taxation is one which receives far less than the amount of attention which it requires. It will force itself more upon the public mind as time goes on. Economic facts are hard things to dodge indefinitely; and some day it will be realized that the incidence of suffering is far wider than the incidence of the taxation which causes it. Then, no doubt, people will be more careful to judge the representatives who govern them, both at home and at Westminster, from among those who have demonstrated possession of the ability to save money, and not merely the capacity to spend it. The rôle of an economist may be neither a romantic nor a picturesque one, but at this stage in the country's fortunes it is surely entitled to rank higher than a mere aptitude for increasing the burdens of the tax and rate payers. It will become apparent in course of time that even the temporary beneficiaries of lavish expenditure must eventually have to pay dearly for what they receive. At the present moment we are having proposals, schemes, programmes, and what not, suggested for curing the disease which threatens our industrial existence; but where are those that are designed to heal the wound from which the life-blood is flowing? How many of those with remedies are "barking up the wrong tree?" The "right tree" is a lightening of the burden of taxation. Without this we feel that a return to real industrial prosperity will be difficult to the verge of impossibility. The danger is clearly indicated in a report just issued by the Federation of British Industries.

These remarks may appear to have strayed rather far from Mr. Bradshaw's statement at the meeting of the Commercial Gas Company, but in reality they are very close to it. Does he not himself draw a convincing picture of the diré consequences to the inhabitants of the East End of excessive rates? And is there any reason to suppose that what happens there does not happen elsewhere under like conditions, or that with excessive Imperial taxation the whole country does not suffer just as any part of it does under excessive local rating? This is not a question of either local or Imperial politics, in which the Company rightly refrain from participating; it is merely a matter of plain, sound common-sense. However, things are, as has been stated, improving; and, with falling rates, Stepney and Poplar are now, we are told, by reason of their close proximity to Central London, very attractive districts. When this becomes more generally known, the return of the old, and possibly some new, manufactures and industries is anticipated. So long as the local rates exhibit this welcome tendency towards a lower level, one must join Mr. Bradshaw in his optimism with regard to the prospects of the Commercial Gas Company.

Buy British Goods.

WHAT better slogan could there be at a time like this, when unemployment is among the problems which urgently demand solution, than the simple words, "Buy British Goods?" This is a way of helping others, and at the same time of helping ourselves; for the mischief of unemployment does not begin and end with the unemployed. If British goods do sometimes cost more, there is ample compensation; for the worker enjoys a higher standard of living here than in some other countries, and this is an immeasurable gain to the community. While Ministers, Captains of Industry, and Leaders in Finance are discussing means of providing work, one wishes that more could be done to bring home to the general public their responsibility in the matter. If (say) some of the films could be made to portray the misery which lack of employment spreads broadcast in its path, instead of reproducing so generously scenes that have not even the remotest resemblance to life as far as the audience are likely to be concerned, perhaps the urgency of the situation would be better realized.

Perhaps the problem cannot be tackled in that way, but

there is another method. Not only this country, but countries in all other parts of the world, are being taught how good are British goods, through the medium of the annual British Industries Fair, which is now taking place in London and at Castle Bromwich, Birmingham. The latter is the Heavy Section, and is that in which the gas industry is so adequately and so appropriately represented. The success of the ten previous Fairs has been pronounced and progressive, and has ensured the continuity of what is the greatest National Trade Fair ever organized solely for extending the sale of British products throughout the world. The exhibitors in the Heavy Section, who in 1926 numbered 400, this year total 1000; and there are 4 miles of stand gangways, representing 8 miles of "shop windows." The first part of the Exhibition Hall, from the main entrance, is occupied by stands relating to general hardware, ironmongery, brassfoundry, metals, and allied industries. The Gas Section, occupying 37,500 sq. ft., with over eighty exhibitors, comes next as one walks through the Fair. There is an increase this year, not only in the area occupied, but in the number of firms represented. Exhibitors have co-operated in the adoption of a uniform colour scheme, and, so far as the nature of their particular products permits, an open type of stand has been adopted. This reveals the Section as a separate entity. The exhibits cover every phase of gas production and utilization, from the marketing of the raw coal, through the processes of carbonization and purification, to the appliances in which the gas is actually consumed. Much hard work is represented of many good friends of the industry.

We feel confident that this year's Fair will break all records, and that the Joint Gas Conference again being arranged in connection with it will prove most helpful to the industry.

'Residuals" and the Price of Gas.

WHENEVER Mr. W. B. McLusky, of Halifax, makes a contribution to the technical proceedings of any gas conference, there is always a useful discussion; and we feel sure that his paper before the Joint Gas Conference at Birmingham to-morrow—see later pages of this issue—will be no exception. He will deal with residual products and their effect on the price of gas, than which there could be no more important topic at the present time, in view of the disastrous influence which Part I. of the Coal Mines Bill would have on our industry if it became law. Since the war the gas industry has had by no means an easy passage. One has only to compare the cost of coal in 1910 with that ruling to-day and likely to rule to-morrow to realize that our industry has made such splendid progress only through constantly increasing internal efficiency. As an example—we quote Mr. McLusky—though the volume of gas manufactured by authorized undertakings during the year 1928 was 41,851 million c.ft. more than the quantity made in 1920, there was a reduction of 4000 tons in the amount of coal carbonized and an increase in the quantities of residual products.

It is somewhat difficult to appreciate the author's observation, in view of the graphs shown in Chart I. of the paper, that the "gap is widening between the gross cost and the net cost of coal," but we understand his meaning and are in hearty agreement with the last paragraph of his contribution. Mr. McLusky is optimistic because he knows from experience that optimism coupled with hard work is justified. He mentions that there is great room for expansion in local sales of coke and tar; in his own area, as many of our readers are aware, he has a most efficient small coke sales organization—long ago he abandoned the absurd, monopolistic idea that, if people wanted gas-works products, they must come to fetch them. In adjusting his business to the modern (and only reasonable) notion of salesmanship, he has ensured the success of his own undertaking, and incidentally he has given a lead to several other concerns. There are many points of great interest in his paper; we call attention to two. He shows that a large production of coke per ton of coal carbonized is not always accompanied by a high price per ton of coke sold, but that in a number of undertakings the higher yields of coke have justified the process, for the receipts for coke per 1000 c.ft. of gas sold are among the highest. We suggest that this is a matter not only of local conditions, but of sales organization—"local" conditions" can cover vices as well as virtues. The other point is that, of all the gas-works carbonizing coal in vertical retorts, 76 p.ct. receive a net income of over 20s. per ton of coke sold, and that, of the undertakings which rely wholly or partly on horizontal retorts, only 43 p.ct. receive 20s. per ton. It is impossible to comment on this on the basis of the bald fact, but we hope that it will give rise to discussion among those attending the conference to-morrow.

The Vice of Parsimony.

IT has been suggested several times in these columns lately that a cheese-paring lighting policy is very definitely a bad one. "If," we said a fortnight ago, "the question "were boldly put up as 'Lamp-posts or lives?' who would "hesitate for a moment as to the answer which he would "give?" This country at present is under-lighted, taken as a whole; even an ordinary lighting scheme—that is, a scheme reasonably adequate to modern traffic conditions—stands out as a blaze of generosity by comparison with areas which surround it. Lately there have been signs of an awakening to the need for more and better light; this movement is bound to grow, and its development is intimately concerned with our industry.

For this reason the paper which Mr. Frederick J. Gould read yesterday at the Joint Gas Conference in Birmingham is more than welcome. In spite of what he aptly terms the "many bright spots," the author deplores the attitude of apathy which, he believes, bespatters the ranks of our industry. We hope that he is too pessimistic about this "canker of indifference;" at the same time it is unfortunately still necessary to emphasize that indifference spells disaster while firm resolve can hold and increase the lighting load of our industry. This is no idle statement. Gas possesses many advantages as an illuminant—for indoor lighting its economy and warmth, for outdoor lighting its power of penetration and its reliability. It is, however, unnecessary for us to labour these advantages here; they are set out clearly in the paper under review. They are sufficient, if properly exploited, to succeed in competition with electricity. Mr. Gould cites an instance where, after intense competition, gas was adopted as illuminant for "one of the finest examples of road lighting in the kingdom." Here the gas and the electricity undertakings were given an opportunity of showing what they could do, and after two years' test the authorities decided on gas.

Of course, we wish that gas had invariably to encounter such fair conditions, and that all authorities were so "enlightened" as in the foregoing instance. We wish, in other words, that when it is proposed to expend more money on lighting schemes, comparative tests on an equitable basis, conducted by an independent authority, were carried out. All too frequently a change-over from gas to electricity is accompanied by a more generous scheme, so that it is most unjust to compare the new installation with the old—a comparison which is inevitable, and unfairly favours electricity. Hence it is suggested that, when alterations, re-arrangements, or extensions to existing installations are contemplated, our aim should be higher lighting values, for any scheme is judged on its illumination merits long after economy has been forgotten.

So far we have had in mind parsimony on the part of public authorities; but it is equally important that we should put our own house in order. Cheese-paring in the matter of quality of fittings is indeed a vice. Gas undertakings are not being truly economical if they purchase inferior fittings; though we think that few indulge in this vice. In the matter of pendants and brackets, there can be no quarrel with Mr. Gould's insistence on the purchase of "genuine British virgin solid-drawn tube;" nor, on the general question of retaining the lighting load, can there be disagreement with his opinion of the value of maintenance. In brief, parsimony will not pay.

Gas Suicides and the Press.

On Thursday last, the Bristol City Coroner appealed to the Press to exercise restraint in reporting cases of gas poisoning. "It is my firm convinced opinion," he said, "that if we did not have reports of these cases we should not have so many happening. It is because you get them reported, and the easiness of it is thrust under the eyes of people whose mentality is tottering, that we have a succession of these cases which is rapidly increasing."

Removal of Carbon Monoxide from Coal Gas.

Speaking on this subject in a lecture in connection with the recent opening of a new lecture building at the Kaiser-Wilhelm-Institüt für Kohlenfoschung, Mulheim-Ruhr, Dr. Franz Fischer observed that it has long been known that there are bacteria which have the power of producing methane, and that there are also others that are capable of utilizing methane in their growth. So far back as 1910 it was shown by the Dutch chemist, Sohngen, that mixtures of hydrogen and carbon dioxide were capable of being converted by bacteria into methane. It has now been shown in the Kaiser-Wilhelm-Institüt that methane can be produced from carbon monoxide and hydrogen in a similar manner, so that a biological method seems to be opened up for the complete freeing of illuminating gas from its content of carbon monoxide. It has yet to be proved, however, whether the speed of this biological reaction can be so accelerated as to make it meet the requirements of prospective industrial processes.

The Complete Gasification Quest.

In the same lecture, Dr. Fischer referred to the continuous gasification of coal or coke to water gas, in place of the present intermittent process. New data which have been worked out by Pichler at the Institüt, he said, have shown that semi-coke on treatment under certain conditions and at relatively low temperatures with hydrogen under pressure gives rise to methane, and even to the higher hydrocarbons of the methane series.

Accuracy in Modern Gas Calorimetry.

In a paper read recently before the Newcastle Section of the Society of Chemical Industry, Mr. L. H. Sensicle, who, until a short time ago, was Chief Chemist to the Newcastle-upon-Tyne and Gateshead Gas Company, referred to the question of accuracy possible in modern gas calorimetry. It is usually held that the absolute accuracy obtainable with the Boys calorimeter is not greater than is represented by a possible error of 0·5 p.ct. of the truth—*i.e.*, with 500 B.Th.U. gas the result may be 2·5 B.Th.U higher or lower than the truth. This estimate, said Mr. Sensicle, appears on the high side. "Nevertheless, to consider the matter from a different angle, the relative accuracy obtainable is, to the author's knowledge, much greater. It has, in fact, been generally found possible for two careful operators to obtain results within 0·1 p.ct. of each other using the same calorimeter on the same gas—*i.e.*, to agree within 0·5 B.Th.U."

An American Development.

Congratulations are offered to the American Gas Association, whose activities have grown to such an extent during the past few years as to render necessary an increase in the space available in their attractive "Monthly." With the New Year, this magazine makes its appearance with a larger size of page, which will accommodate the requisite material without undue bulkiness, and this it is felt will be the more convenient course to adopt. In its new form, the "Monthly" should be equal to the demands of even so virile an organization as the American Gas Association.

Personal.

Sir ARTHUR DUCKHAM, K.C.B., G.B.E., M.Inst.C.E., M.I.Mech.E., and Sir Hugo Hirst, Bart., have been nominated as new Vice-Presidents of the Federation of British Industries, in addition to those already nominated.

The Minister of Health has appointed Mr. C. BRIDE, M.A., B.Sc., A.I.C., to be an Inspector under the Alkali, &c., Works Regulation Act, 1906. He has been assigned to the district with headquarters in London.

Mr. E. H. HARVEY, of the Weights and Measures Department of the Bristol Corporation, has been appointed Inspector of Gas Meters for the city, in the place of Mr. H. W. HARDING, resigned.

The opening proceedings at the Installation Meeting of the Radiant Lodge, No. 4200, at the Café Monico, Piccadilly Circus, on Tuesday, the 11th inst., were presided over by the then reigning Master, W.Bro. A. B. POTTERTON, who subsequently installed his brother, Bro. T. F. C. POTTERTON, in the Chair. The newly installed Worshipful Master then conducted the usual business of the Lodge, and presided at the banquet which followed. The I.P.M. and the W.M. are both office bearers in the Evening Star Lodge, being J.W. and S.D. respectively. The meeting was well attended by members of the Lodge and visiting brethren; among the latter were several members of the Evening Star lodge, including the W.M., W.Bro. J. W. Foreman; the M.E., Bro. J. A. Brentnall; and W.Bro. Frank West, P.M., who recently received Provincial honours as J.G.W. of Derbyshire.

Obituary.

As noticed in the "JOURNAL" last week, Mr. JOSEPH REEDS, of Matlock Bath, died on Feb. 10, in the Derbyshire Infirmary, after a severe operation. He was in his 75th year. Up to a few years ago Mr. Reeds was actively engaged in the conduct of gas undertakings in Derbyshire and Nottinghamshire, and at the time of his death was a Director of the Shirebrook and District and the Southwell Gas Companies.

The death of Mr. TOM WRIGHT, J.P., of Darley Dale (near Matlock), at the age of 75 years, removes a prominent figure from gas circles in Derbyshire. He was Chairman of Directors of the Matlock and District Gas Company, the Chapel and Whaley Gas Company, and the Hathersage Gas Company, and he was also on the Board of Directors of the Churnet Valley Gas Company. After leaving school he entered the service of the Railway Company at Darley Dale, where his father was stationmaster. On his father's death Mr. Tom Wright became a coal merchant, and he met with remarkable success. In addition to the Gas Companies, he was closely identified with most of the important industrial concerns in Derbyshire, with many as a Director.

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Feb. 22.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the Greenock Gas-Works.

Feb. 22.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting in Huddersfield. Paper by Mr. B. Thorpe (Huddersfield).

Feb. 25.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at No. 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

Feb. 27.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual meeting of members in South Wales, Gas Offices, Cardiff, 3.30 p.m.

Feb. 28.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Dr. S. Pexton on "The Water Content in Tar."

March 6.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the afternoon.

March 6.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual General Meeting, Grand Hotel, Birmingham.

March 11.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board.

March 25.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—Diamond Jubilee and Annual Meeting, Midland Hotel, Manchester.

March 28.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual General Meeting at the Hotel Cecil, Strand, W.C. 2, 2.15 p.m.

June 2-5.—INSTITUTION OF GAS ENGINEERS.—Annual Conference in Leeds.

In To-Day's "Journal."

Gas Poisoning Committee's Report.

The report of the Departmental Committee appointed by the Board of Trade "to consider the increase during recent years in the number of deaths ascribed to poisoning by coal gas supplied for domestic purposes, and to make recommendations as to any measures relating to the production and use of gas for domestic purposes which might be taken with a view to diminishing the number of such deaths," has been published (price 6d.). No limit is prescribed for the carbon-monoxide content of town gas; and it is agreed that the addition to gas of substances designed to act as irritants or to give to gas a distinctive penetrating odour not now associated with coal gas is neither desirable nor necessary, having regard to the relatively small number of fatal accidents caused by gas compared with the large number of persons exposed to the danger of gas leakage, and the probability that intending suicides either would not be deterred thereby or would seek, and find, some other means of suicide.

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Joint Gas Conference in Birmingham.

Two of the papers at this conference—one on "Gas Lighting" by Mr. F. J. Gould; the other by Mr. W. B. McLusky, on "Residuals and their Effect on the Price of Gas"—are published. Mr. Gould is not satisfied that we are doing all we can to retain and increase the lighting load; while Mr. McLusky indicates that only by constant effort—particularly in regard to local sales—can we hope to maintain a good ratio between gross cost and net cost of coal.

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British Industries Fair.

A full description, profusely illustrated, is given of the exhibits in the Gas Section at the British Industries Fair, Birmingham.

Illuminating Engineering Society.

Replying to the toast of "Our Guests" at the annual dinner of the Illuminating Engineering Society on Wednesday last, Mr. Harold E. Copp, M.Inst.C.E., Senior Vice-President of the Institution of Gas Engineers, said: I am a convinced believer in the future wellbeing of the gas industry, and hold the opinion that it will, side by side with the electrical industry, continue to progress. I base this opinion upon three facts: One is that in countries where electrical development has advanced more rapidly than it has in this country, gas is making remarkable progress. America is an example of this. The second is that any industry which can show such wonderful efficiency in the use of its raw material—coal—as the gas industry, must surely be in no danger of extinction. The third is that, although we have been passing through a period of financial disturbance which has depreciated the capital value of most of our industries, the storm has hardly produced a ripple upon the placid surface of the gas stock market.

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Area Gas Supply Committee.

The statement is made in the report of the last meeting of the Central Executive Board of the National Gas Council that evidence on behalf of the gas industry will be heard by the Area Gas Supply Committee on Feb. 24, and, if necessary, upon the following day.

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Reports of Company Meetings.

Reports of the general meetings of the following Commercial Gas Companies appear: South Metropolitan; Wandsworth, Wimbledon, and Epsom District; South Suburban; and Croydon.

Correspondence.

[We are not responsible for opinions expressed by Correspondents.]

Horizontals at the Fuel Research Station.

SIR,—Having been responsible to the Director of Fuel Research, Dr. C. H. Lander, for the design of the horizontal retort plant at the Fuel Research Station, East Greenwich, the working of which installation formed the subject of Mr. G. Percival's paper on "Observations During the Working of Horizontal Retorts" before the London and Southern District Junior Gas Association, I would like to enlarge briefly upon a few of the points brought out in the discussion.

The problem in designing an isolated setting, if it is to give satisfactory results, is to reduce as far as possible the excessive radiation losses as compared with ordinary settings in a bench. At the Fuel Research Station special provision was made by using a large amount of heat insulation material in the four walls and at the top of the setting.

A further point of importance was the provision of an exceptionally large producer to make quite certain that, even if the radiation losses were considerable and poor fuel was being used, the required temperature could be maintained in the setting.

The producer was provided with a damper in the outlet flue to facilitate the change-over from producer to water gas heating.

The retorts were not, as was stated in the discussion, of Stourbridge fireclay, but were of the siliceous type—about 77 p.ct. silica and of "C.O." quality—made by Messrs. Joseph Morton & Co., of Halifax, while the retort cross-walls were of Derbyshire silica—92 p.ct. silica. The combustion chamber arch was built of Meltham silica (95 p.ct.).

Cort's anti-dips were used in the hydraulic mains, and a Parkinson retort house governor was adopted to control the vacuum.

A "Dryco" coke cooling apparatus made by Messrs. Aldridge & Ranken, Ltd., was installed for the purpose of producing dry coke, thus facilitating accurate weighing and simplifying the laboratory work.

All other materials were supplied by Messrs. Gibbons Bros., Ltd., who built the setting, which was to a large extent in other respects of their usual standard and design, while the machine adopted for charging and discharging was of the Guest-Gibbons type.

I was interested to notice that these retorts are credited with a maximum capacity of 128 therms per retort per day, which is a high figure for semi-silica or siliceous retorts 20 ft. by 23 in. by 15½ in. in size.

While a great deal is claimed in the paper as the result of controlling the temperature by using a chimney damper, it would always be difficult to obtain similar advantageous results in large-scale practice where, instead of one setting and one chimney, there would be a number of settings to one chimney.

Interesting mention is made of the use of waste gases for increasing the volume of the heating gases.

Might I suggest that it would be of considerable value were practical work carried out at the Fuel Research Station on the return of waste gases to the producer grate, which system has been adopted with success in the United States, but has so far rarely been attempted in this country?

G. M. GILL.

82, *Victoria Street, S.W.* 1,
Feb. 10, 1930.

Gas and Electricity.

SIR,—I am much interested in your reference to-day to the prevalent newspaper practice in giving prominence to the words "gas" or "gassed" in such a manner as to create an impression that town gas is the culprit, even if the real defaulter is sewer gas, or vapours from bituminous materials used as an insulating covering for electricity conduits, or the actual source is doubtful; and also, having observed that electricity is taboo, and if at fault is disguised under such terms as "a short circuit" or "a fuse," which have no meaning to many readers.

Having recently had occasion to consider the prospects of a gas company purchasing in bulk and undertaking distribution only, attention was directed to the difference between units generated and units sold, as included in the statistical returns which are set forth in the "Electrician" Annual Tables for 1928. The figures suggest that the advantages expected to result from super power stations and long-distance high-voltage distribution will be discounted by large percentages of "unaccounted for." They explain the preference for generating stations near the centre of the supply district, of which Battersea is an example.

Some of your readers who have experience in electrical plant may be able to explain why the loss in distributing electricity is much greater than is the case with gas, and the possible association with "accidents" of mysterious origin.

N. H. HUMPHRYS.

5, *Wyndham Road, Salisbury.*
Feb. 12, 1930.

Commercial and Industrial.

Stock Market Report.

[For Stock and Share List, see later page.]

The volume of business in the Gas Market last week was less than usual. There were no features of outstanding interest, and prices in most cases were a trifle down on the previous week. The uncertainty with regard to the Government's financial policy is a disturbing factor, and following on the reduction in the Bank rate investors may be awaiting the possibility of new issues.

As will be seen from the Stock and Share List, there were very few changes in the quotations. Sheffield consolidated rose 1 point to 105-107 (at Sheffield), and three debenture stocks were marked up, Sutton 5 p.ct. debenture gaining 3 points to 91-94. Several dealings at prices from 99 to 100 pere recorded in the ordinary stock of the Uxbridge, Maidenhead, and Wycombe Company; and on the dividend recommended for last year (7 p.ct.) a purchase at, or about, par is a very profitable investment. Like many other gas securities, however, the stock is closely held, and a standing order with a broker will probably be necessary. The accounts of the Company have just been received and show a satisfactory position. The dividends paid for the three previous years were: 1926, £6 10s. p.ct.; 1927, £6 11s. 3d. p.ct.; 1928, £6 18s. 9d. p.ct.

The Aldershot Gas, Water, and District Lighting Company are selling by tender £100,000 5 p.ct. perpetual debenture stock at a minimum price of £93 p.ct., yielding at this price £5 7s. 6d.; and we understand that the Primitiva Company last week privately placed a parcel of 60,000 £1 shares, the proceeds of which will be utilized for the general purposes of the Company.

Among last week's dividend announcements were the following:

—	December Half-Year. P.Ct.	Total for Year. P.Ct.	Previous Year. P.Ct.
	£ s. d.	£ s. d.	£ s. d.
Barnet	3 10 0	7 0 0	7 0 0
Derby	5 0 0	8 10 0	8 10 0
European	3 10 0	5 10 0	5 10 0*
Newcastle	2 17 6	5 7 6	5 3 9
Sheffield	3 5 0	6 10 0	6 10 0
South Shields	4 5 0	8 10 0	8 10 0
Uxbridge	3 10 0	7 0 0	6 18 9

* Free of tax.

Coal Markets.

The weakness reported last week has developed still further, and markets generally have suffered a very pronounced setback in the past fortnight or so. Stocks everywhere are said to be abnormally high, due no doubt to consumers having taken precautions against such weather as was experienced last year. Exporters consequently are finding the greatest difficulty in getting them to take even contract quantities. New business is in abeyance, even at the reduced figures that have been quoted, and there seems to be a general idea among consumers abroad that prices are going lower.

An example of the drop which has taken place so suddenly is Durham coking coals. Only a fortnight ago it was reported that there was congestion of boats at North-East coast ports waiting for cargoes of these, with prices firm at 16s. f.o.b. To-day prompt business is scarce, and prices nominal at 15s. Gas coals are quiet and easy on all markets. Wear specials are nominally 17s. 3d. to 17s. 6d. f.o.b., but this can be discounted for prompt business, and the same applies to best qualities at 16s. 6d. Seconds are weak at round 15s. Approximate official export prices are 17s. 6d. to 18s. for Yorkshire screened gas, washed trebles 17s. 9d., doubles 16s. 9d. to 17s. single 15s. to 15s. 3d. Here again business on both home and export account is extremely slow. A good sale of Durham gas coals for the Amsterdam Gas-Works is reported, said to amount in all to 120,000 tons for March to December, and based on the better prices obtainable a few weeks ago.

Gas coke has shared in the general weakening of values, and 22s. 6d. now seems the general average quotation, without any great demand.

Trade Notes.

"It Pays to Fertilize."

An attractive showcard has been produced by the Imperial Chemical Industries, Ltd., which is being used by various gas companies throughout the country, to demonstrate the value of sulphate of ammonia for fertilizing purposes.

Tully Plant at Keith.

The Keith Gas Company has placed an order with Tully, Sons, & Co., Ltd., of Newark, for remodelling their "Tully" plant, which has been in use for the past ten years, by the addition of a mechanical operator and all the latest improvements that have recently been made in the plant.

The Driffield Urban District Council have approved the expenditure of £880 on additional retorts at the gas-works to meet the steadily growing consumption.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 17.

The prices of tar products remain unchanged.

Creosote for export is 6¼d. to 6½d. per gallon f.o.b.

Pitch is 47s. 6d. per ton f.o.b.

Pure toluole is 2s. 5d. to 2s. 6d.; solvent naphtha 95/160, about 1s. 5d.; pure benzole, about 1s. 11d.; and pyridine bases, 3s. 9d., all per gallon.

Tar Products in the Provinces.

Feb. 17.

The average prices of gas-works products during the week were: Gas-works tar, 22s. 6d. to 27s. 6d. Pitch, East Coast, 46s. f.o.b. West Coast (f.a.s.)—Manchester, 40s. 6d. to 41s.; Liverpool, 44s. to 45s.; Clyde, 44s. to 45s. Toluole, naked, North, 1s. 7¼d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3½d. to 3¾d.; low-gravity, 1¼d. to 1½d.; Scotland, 3½d. to 3¾d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 4d. to 2s. 5d. prompt. Naphthalene, £12 to £14. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Tar Products in Scotland.

GLASGOW, *Feb.* 15.

There is no change to report in market conditions during the week. Tar spirits continue to attract some attention, and prices are firm; but makers have now sold their prompt production.

Pitch.—There is very little business passing, and values are purely nominal. Export price is 47s. 6d. to 50s. per ton f.a.s. Glasgow, and for home trade 53s. 6d. to 56s. is being obtained, *ex* works.

Tar.—A fair volume of business is passing at 4d. to 4¼d. per gallon filled into buyers' packages at works.

Creosote.—Values are unaltered. B.E.S.A. specification is 3¼d. to 4¾d. per gallon; low gravity, 3d. to 3½d. per gallon; neutral oil, 3d. to 3½d. per gallon, all f.o.r. works.

Cresylic quotations are easier, particularly for forward delivery. Pale 97/99 p.ct. is 1s. 8¾d. to 1s. 9¾d. per gallon; dark 97/99 p.ct., 1s. 7¼d. to 1s. 8¼d. per gallon; pale 99/100 p.ct., 1s. 11¾d. to 2s. 0¾d. per gallon; high boiling, 1s. 9¼d. to 1s. 10¼d. per gallon, all in bulk quantities *ex* works.

Crude naphtha is unchanged at about 5½d. to 6d. per gallon free on rails works.

Solvent naphtha.—A further advance is recorded in 90/160 grade, which is commanding 1s. 2½d. to 1s. 3½d. per gallon; but 90/190 grade remains at 1s. 0½d. to 1s. 1½d. per gallon.

Motor benzole keeps steady at 1s. 6½d. to 1s. 6¾d. per gallon *ex* works in bulk quantities.

Pyridines.—Orders are scarce; 90/140 is 4s. 3d. to 4s. 6d.; 90/160, 3s. 3d. to 3s. 6d.; 90/180, 2s. 6d. to 2s. 9d.; all per gallon *ex* works in buyers' packages.

Benzole Prices.

The following are considered to be the market prices at the present time:

	s. d.	s. d.	
Crude benzole	0 10	to 0 11	per gallon at works
Motor ,,	1 5½	,, 1 6½	,, ,, ,,
Pure ,,	1 10	,, 1 11	,, ,, ,,

Contracts Open.

Condensers, Pumps, Exhausters, Scrubber, Purifiers, &c., &c.

The Corporation of Kendal invite tenders for the above among other plant. [See advert. on p. 526.]

Gas-Works Remodelling.

The Corporation of Kendal invite tenders for various plant in connection with the remodelling of the gas-works. [See advert. on p. 526.]

Meters and Governors, &c.

The Corporation of Kendal invite tenders for meters and governors, &c. [See advert. on p. 526.]

Oxide Disintegrator.

The Corporation of Kendal invite tenders for the supply of an oxide disintegrator. [See advert. on p. 526.]

Pipes and Specials, &c.

The City of Coventry Gas Department invite tenders for the supply of steel mains, specials, &c., and labour and appliances for jointing and testing. [See advert. on p. 526.]

The Holme Cultram Urban District Council Gas Department invite tenders for the supply and delivery of steel mains. [See advert. on p. 526.]

Sulphate of Ammonia, &c., Plant.

The Corporation of Kendal invite tenders for the supply of sulphate of ammonia plant. [See advert. on p. 526.]

On the District.

Efficiency of Hot Water Appliances.

Excellent material for the selling side continues to emanate from the "B.C.G.A." Circles, and valuable hints were contained in a paper recently read before the Southern District (London Area) Circle by Mr. J. G. Clark, of the Gas Light and Coke Company. The full text, and an interesting discussion, are fully reported in the recently issued February number of the "Gas Salesman." Gas service, said the author, cannot be regarded as complete until all possible waste is avoided. To this end it is not sufficient to select an apparatus of high thermal efficiency, although this is of the first importance. In addition, it must be erected in the right way, and *the user instructed in the right method of using it.* In order to be able to impart the necessary instruction to the consumer, the salesman must understand certain fundamental principles which affect efficiencies, and some of these, as regards water heating appliances, were dealt with by Mr. Clark, under the main headings of heat transference, material, thermal efficiencies, and heat losses and their prevention.

How to Run a Bath.

Water for a bath, he said in conclusion, may be drawn from a geyser in three ways:

(*a*) Drawn hot (say, 160° Fahr.); subsequently filled up with cold;
(*b*) drawn sufficiently hot to require no dilution;
(*c*) drawn hot (160° Fahr.) into a bath already partly filled with cold water.

On a geyser efficiency of about 84 p.ct. a "bath" mean efficiency on the three types of draw will amount to (*a*) 65 p.ct.; (*b*) 72 p.ct.; and (*c*) 79 p.ct. for baths ranging in size from 15 to 30 gall. capacity.

When geysers are used, the bath plug is frequently only inserted when the water is starting to run warm or hot from the geyser spout. This practice may account for a 3 to 10 thermal efficiency drop in terms of return on the total amount of gas used. Similarly, after the gas is turned out, it is frequently the practice to stop the water flow at the same time. This accounts for a thermal efficiency loss of 2 to 6. The water equivalent of baths varies considerably, and may range from 1 gall. for a small iron bath to 2½ gall. for a large earthenware bath, and therefore has the same effect as adding 1 to 2½ gall. of cold water to the hot water delivered to the bath.

Hotel Slot-Meter Charges.

Very interesting propaganda material on the subject of hotel room heating was contained in No. 191 of "A Thousand-and-One Uses for Gas," but the question of charges that should be made to visitors is still a vexed one. A correspondent, writing to the "Gas Salesman" on the subject, put forward the following points, which are worthy of consideration:

"In the matter of profit accruing to the proprietors on the sale of gas through prepayment meters, figures of from 25 to 60 p.ct. above the charge to ordinary consumers appear to be common practice. Now many gain their first experience of, say, a gas fire in these establishments, and the natural inference is that a gas fire is an expensive means of heating. They restrict its use as far as possible, and, in cases I have known, even refuse to use it. All this, of course, will be broadcast to their acquaintances. Of what use is this to the gas undertaking? It would be far better not mildly to agree with the proprietor on these large profits, but to recite to him the 'savings,' by eliminating coal scuttles, fire irons, grate cleaning, blackleading, hawking coal upstairs and ashes downstairs, wear and tear of carpets, lighting, attending, extra dusting, flue sweeping, &c., and seeing that all these duties are carried out. A proprietor on my district directed that the meters be set to credit meter price. He would be pleased to pay all rents of apparatus as a 'set off' against the work, worry, and wear and tear entailed in looking after coal fires. I contend that it is in the gas undertaking's interest to use persuasion towards offering gas at as little profit as possible, so that the use is encouraged, meaning increased output, and, which is equally important, the creating of a good impression among a huge floating population, many of whom are potential consumers on their own account."

A Window Display Suggestion.

Distance lighting methods, as applied to gas lighting, are, perhaps, not so universally employed as their usefulness warrants. This method of "switching on the gas" has been on the market for at least twenty-five years, but even so, a very small percentage of houses lighted by gas have this useful (and now extremely dependable) adjunct. It is an appliance which helps more than any other to combat that expression, which we in the gas industry so often hear when putting forth the claims for gas lighting as against electric lighting—"it is so easy to switch on," and if salesmen were to demonstrate and talk to consumers more of this "switching on the gas," it would certainly help to conserve the lighting load.

The Sunderland Gas Company recently had an attractive window display for this purpose, showing the figure of a lady standing at the door of a room, in the act of switching on the gas. Two brackets, fitted up at the side, were connected to a pressure meter which caused the lights to go on and off, thus giving the effect of the lights being switched on and off. It proved of considerable interest to passers by, and incidentally brought forth quite a number of inquiries and orders, mostly from people who said they never knew it was possible to control gas lighting in this manner. One consumer in particular was definitely saved to gas lighting through this appliance being brought to her notice, and, if this was only one case, it proves that distance control will, more than anything else, help to demonstrate that gas is equal in convenience to electric lighting, besides being a better, cheaper, and healthier form of lighting.

Education for Salesmanship.

An announcement of first-rate interest in the February "Gas Salesman" is to the effect that Herbert N. Casson, beginning with the March issue, is contributing a series of articles on Salesmanship to the gas service monthly. Mr. Casson has been described as "the most forceful business writer in Great Britain, the foremost teacher and applier of business efficiency in Europe." His own "Efficiency Magazine" has a circulation of 48,000 in seven different languages, and 340,000 copies of his books, which number nearly forty, have been sold. Salesmen of the gas industry, who will have this opportunity, in their own magazine, of reading these exclusive articles by Mr. Casson, should not fail to give them the closest study. No writer that we know combines interest with instruction more effectively than Mr. Casson.

Price Reduction at Cowes.—The Directors of the East Cowes Gas Company have announced a reduction in the price of gas of ½d. per therm (making the price 10d. per therm) to take effect as from the date of reading the meters for last Christmas quarter. A corresponding cash rebate will be allowed to prepayment meter consumers.

European Gas Company, Ltd.—The Board have decided, subject to audit, to recommend a final dividend for the year 1929 at the rate of 7s. per share, making a total of 11s. per share, or 5½ p.ct. for the year, free of income-tax. The final dividend for 1928 was at the rate of 7s. per share, making a total of 11s. per share, or 5½ p.ct. for the year.

Wolverhampton Fitters' Dinner.—At the Molineux Hotel, Wolverhampton, on Feb. 11, a large gathering of Wolverhampton Gas Company fitters, &c., held their second annual dinner and concert, the Chair being taken by Mr. A. Coombe (Fittings Superintendent). As a tribute to their late chief, Mr. P. G. Winstanley, the Company stood in silence for one impressive moment. Mr. A. Coombe proposed the toast of the "Wolverhampton Gas Company," coupling the names of the Directors, Manager, and Engineer. The musical items were provided by Messrs. H. Carrington Bailey and P. Baker's party, and a most enjoyable evening was spent.

Autocontrol Boilers have been registered with a nominal capital of £20,000 to carry on business as ironfounders, mechanical engineers, manufacturers of gas engines and gas boilers.

Lighting in Factories and Workshops.—The Third Edition of "Lighting in Factories and Workshops" (Welfare Pamphlet, No. 7) has been issued by the Home Office, and is obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, price 4d. net.

Ministry of Health Inquiry at Goole.—A Ministry of Health inquiry was held at Goole, last week, under Mr. G. M. McNaughton, into the application of the Urban District Council for power to borrow £5000 for extension of the carbonizing plant at the gas-works, and a further £1000 for a naphthalene washing and gas-drying installation. Mr. J. W. Pullon, Clerk to the Council, said that the increase in consumption in the past ten years had been such that they were now approaching the maximum capacity, and the increase was fully expected to be continued. Mr. A. F. Yates, Gas Engineer and Manager; Councillor E. Johnson, Chairman of the Gas Committee; and Mr. W. E. Dulson, the Council's accountant, gave evidence in support of the application. There was no opposition.

Topical Items.

Annual Dinner and Dance of the Midland Association of Gas Engineers and Managers.

The Annual Dinner and Dance of the Midland Association of Gas Engineers and Managers was held at the Grand Hotel, Birmingham, on Feb. 10, when nearly 140 members and their friends attended—the President (Mr. C. M. D. Belton, of Shrewsbury) in the Chair.

The Loyal Toast was given by Mr. Belton, and the President's toast by Mr. C. S. Shapley, President of the Institution of Gas Engineers. Mr. Belton, in responding, welcomed the many ladies who were present.

After the dinner, the room was prepared for the dance, when to the music of a pleasing orchestra, the party indulged in dancing until midnight. An interesting and enjoyable variation in the programme was provided by solos given by Madam E. Broughton and Mr. John S. Cranmer, with Mr. Frank Edwards at the piano, and Mr. Percy Owens, entertainer.

Scottish Juniors Discuss Use of Concrete in Gas-Works.

At a meeting of the Scottish Junior Gas Association (Western District) on Jan. 25, Mr. Alexander Tran, Assistant Engineer and Manager of the Helensburgh Gas Department, read a paper entitled "Notes on Ferro-Concrete." An extract from this was published in the "JOURNAL" last week, and the following is the discussion:

Mr. D. KEILLOR (Greenock), the President, opening the discussion, agreed that ferro-concrete buildings had a great future. He also asked the author if he had found vibration troublesome in connection with reinforced concrete work.

Mr. D. MELVIN (Uddingston), Vice-President, asked what was the hardness of quick-setting concrete after four months and four years. He mentioned that a recent large building in Glasgow had been constructed during the winter. He instanced the case of a 4-in. concrete bottom in a purifier disintegrating after a time. He suggested that the artificial oxide which was used in this particular box might account for this.

Mr. CAMPBELL (Falkirk) considered, from a cost point of view, that ferro-concrete was a good proposition when compared with steel. The buildings at the Wembley Exhibition were an outstanding example of ferro-concrete work. Careful supervision was a most important factor. He asked Mr. Tran if oil, ammonia, tar, and gas had any effect on concrete.

Mr. S. MCGOVAN asked how the tests for compression and tensile strength were carried out.

Mr. R. FIFE (Kilmarnock) asked Mr. Tran's opinion of reinforced concrete for retort house bunkers. Did the varying temperature adversely affect the structure?

Mr. D. GORDON (Glasgow) stated that steam was used during frosty weather in ammonia. Was this to be recommended?

Mr. FULTON (Helensburgh) said the paper was excellent for a Junior Association. It supplied the elementary essentials of reinforced concrete work. That particular work had now become a science, and the adaptations of the work were legion. He gave the experience of the use of a sand which appeared suitable in every way, but when put to use had failed. Rapid-setting cements were now in more general use and were proving eminently satisfactory.

Mr. FRAZER (Glasgow) considered the fire resisting ability of ferro-concrete not so great, instancing the case of a fire in a large reinforced concrete coke hopper, where a large portion of the concrete fell away. Mr. Frazer contended that the warping of the steel was always a danger. He also dealt with the difficulties of making a satisfactory repair.

Mr. TRAN, in his reply, stated that breeze should never be used in reinforced concrete work, on account of its sulphur content. Ability to withstand vibration was a feature of reinforced ferro-concrete. Quick setting cements had an equal life to the ordinary. Tar and liquor mills could be quite watertight without any admixture. He knew of no previous case of concrete softening, and attributed this to oxide. Poor shuttering could completely disfigure a building. Oil, tar, ammonia, and gas had no effect on concrete.

In reply to Mr. Fife, he stated that the coefficients of expansion for concrete and steel were close for all ordinary working temperatures. Steam was not used; the practice in frosty weather was to suspend operations.

At the same meeting, Mr. Alfred A. McFarlane, of Dalmarnock, read his Diploma Thesis on "The Heating of Retorts by Gas from a Low-Temperature Carbonization Plant"—see also last week's "JOURNAL." At the close of the paper, Mr. MCEWAN stated that two Diplomas had been gained by members of Dalmarnock Works, and this paid a very high compliment to Mr. Frazer, the Manager.

Wales and Monmouthshire Juniors Visit the Morriston Gas-Works, Swansea.

On Jan. 11 the Wales and Monmouthshire Junior Gas Association visited the Morriston Works, Swansea, to inspect a new self-clinkering water gas generator. The party were conducted over the plant by Mr. J. A. Cunniffe.

The visitors assembled later at the Hotel Metropole, Swansea, where they were entertained at tea—Mr. W. H. JOHNS, Engineer and Manager of the Swansea Gas Light Company, presiding. He was supported by Mr. W. Clark Jackson (Neath).

Mr. W. E. CROWLEY (President of the Association) occupied the Chair at the meeting which followed, when Mr. C. S. Thane, of Newport, read a paper on "Mechanical Operations on a Gas-Works—Details of Conveyors and Elevators." An extract from this, and a report of the discussion, will be given later.

European Gas Company.

An Extraordinary General Meeting of the above-named Company will be held in the Middlesex Room, Great Eastern Hotel, Bishopsgate, London, on Tuesday, March 11, 1930, at 11.30 o'clock in the forenoon (or so soon thereafter as the business of the Ordinary General Meeting of the Company, to be convened for the same place and day at 11 o'clock in the forenoon, has been concluded), when the following resolutions will be proposed as special resolutions of the Company:

RESOLUTIONS.

1. That the Memorandum and Articles of Association submitted to this meeting and signed for identification by the Chairman be approved, and that the form of the Company's constitution be altered by submitting such Memorandum of Association with the extended objects as therein set forth and such Articles of Association for the Company's Deed of Settlement and all regulations of the Company subsequently made and now in force, and that the Directors be authorized to apply to the Court to confirm this resolution.

2. That upon the sanction of the Court being obtained to the alteration of the Company's constitution in manner aforesaid whether with or without modification the whole of the shares in the capital of the Company other than the shares in respect of which share warrants are outstanding at the date when such sanction is obtained be converted into stock, and that such excepted shares as and when any person becomes registered as the holder thereof be converted into stock and that the Directors be authorized to carry this resolution into effect.

A Light Gas Mask for Workers Who Come in Contact with Poisonous Gases.

With the discovery of hopcalite, a specially prepared mixture of manganese dioxide and copper oxide which converts carbon monoxide into carbon dioxide, it has become possible to make gas masks which give protection against afterdamp, provided there is sufficient oxygen present in the air to maintain life, and in the United States of America a gas mask, the "All Service" mask, has been approved by the Bureau of Mines and has been used in mine rescue work with considerable success.

Close co-operation is maintained between the British Safety in Mines Research Board and the U.S. Bureau of Mines under a scheme which provides both for the carrying-out of joint researches and for the exchange of investigators who are specially skilled in particular subjects. Under this scheme Dr. S. H. Katz, Chemist-in-Charge of the Bureau of Mines gas mask laboratory, came to this country in April, 1928, and for just over a year joined with a member of the Safety in Mines Research Board's staff in carrying out investigations in the Board's laboratories at Sheffield, with the object of designing a mask which would be as efficient against poisonous gases as the "All Service" mask, but would offer appreciably less resistance to breathing.

An account of these researches is now published by the Safety in Mines Research Board under the title of "Mine Rescue Apparatus: The S.M.R.B. Gas Mask," by S. H. Katz and C. S. W. Grice (S.M.R.B. Paper 57, H.M. Stationery Office, price 9d. net). Though the mask was designed primarily for mining purposes, it is hoped that it may prove suitable for the use of other workers who are liable to encounter poisonous gases in the course of their occupation.

This Year's World Power Conference in Berlin.

Gas and its cognate subjects figure largely in the list of papers to be presented at the Second Plenary World Power Conference, Berlin, June 16 to 25.

Under the authority of the British National Committee, Dr. R. Lessing will contribute a paper on "The Economic Value of Coal Cleaning in Relation to the Problem of Dust and Sulphur Emission from Chimneys;" and "The Sale of Coal under Specification" will be dealt with by Mr. R. A. Burrows and Mr. N. Simpkin.

"The Purchase and Sale of Coke to Specification" is to be treated by Mr. E. C. Evans (Authoritative Body: The National Federation of Iron and Steel Manufacturers).

Among papers to be contributed jointly by Drs. A. E. Dunstan and F. H. Garner, and Messrs. J. Kewley and W. H. Coleman is one on "Motor Fuels produced in the United Kingdom by Low-Temperature Carbonization of Bituminous Coals" (Authoritative Body: Institution of Petroleum Technologists).

GASEOUS FUELS.

The following papers have been submitted by the Joint Fuel Committee, which is composed as follows: Institution of Gas Engineers, Coke Oven Managers' Association, Society of Chemical Industry, Institute of Fuel, Society of British Gas Industries, and Institution of Chemical Engineers:

"The Bearing of Fluctuations in the Price of Coke and Bye-Products on the Cost of Production of Gas," by Mr. Michael Barash.

"Mains and Cables in Highways," by Mr. Stephen Lacey.

"Comparison between the different Types of Gas Available for Use in Industrial and Metallurgical Furnaces, with Special Reference to Calorific Value and Sulphur Content," by Mr. H. Clifford Armstrong.

"Methods of Encouraging the Use of Gas in Industry," by Mr. E. W. Leask.

"Relative Places of Gas and Electricity in Industrial Heating," by Sir Robert A. Hadfield, Bart., and Mr. R. J. Sarjant.

"The Principles of Design, Construction, Operation, and Testing of Domestic and Industrial Gas-Heating Equipment," by Mr. James Wood and Mr. Gilbert B. Howarth.

"Producer Gas Practice from the Point of View of the Carbonizing Industries and the Utilization of Low-Price Fuels," by Mr. M. E. Rambush and Mr. Frank S. Townend.

"Liquor Effluents from the Gas and Coking Industries," by Dr. Allan C. Monkhouse.

"The Synthetic Ammonia Industry," by Col. G. P. Pollitt.

"The Economics and Commercial Development of Low-Temperature Carbonization in Great Britain," by Dr. C. H. Lander, C.B.E.

"The Economics of Benzole Extraction in the Gas Industry," by Mr. Harold Hollings.

POWER AND LEGISLATION.

"The Extent and Nature of Control by Public Bodies, with reference to the Economic Organization of Gas Undertakings, and the Economic Relations between Consumer and Supplier," by Mr. T. P. Ridley (Authoritative Body: National Gas Council).

EDUCATION.

"The Training of Gas Technicians," by Mr. Francis W. Goodenough, C.B.E. (Authoritative Body: Institution of Gas Engineers).

Scottish Juniors Visit Works of Messrs. James Keith & Blackman Company, Ltd., at Arbroath.

The Scottish Junior Gas Association (Eastern District) paid a visit to Arbroath on Saturday, Feb. 8, inspecting Messrs. Keith & Blackman's works in the morning and the Corporation Gas-Works in the afternoon.

AT THE KEITH-BLACKMAN WORKS.

The party, about 40 strong, met at the James Keith Hall, adjoining Messrs. Keith & Blackman's works, and on arrival were entertained at light refreshments by the firm. Mr. W. B. Davidson (Works Manager) welcomed the Association in the name of the firm. Before starting on a tour of inspection of the works, the party showed keen interest in the splendid arrangements made by the firm for the welfare of their employees. The Keith Hall is used as a workers' club room, and the Association were unanimous in their admiration of the excellent facilities provided.

In the works, particular interest was attracted by the manufacture of the combined fan and soot collector. This is a new apparatus which combines the formation of the necessary draught for boilers, and, at the same time, extracts the dirt and grit from the flue gases. In the sheet metal department gas is used exclusively for heating rivets and also for the heating of stamped plates. In the fitting shop the party had an opportunity of seeing the Keith fans, Blackman volume fans, gas blowers and boosters, and gas cleaning fans in course of erection, and the excellent finish of the appliances was noted. The machine shop was then inspected; this is equipped with modern machine tools. A tour of the stores completed an interesting and instructive visit.

The members then adjourned to the Imperial Hotel, where they were welcomed by Provost William Chapel, Councillor Alexander Bruce (Convenor of the Gas Committee), Bailie Sheriffs, and Mr. Alexander C. Young (Engineer and Manager of the Gas Department), and entertained at luncheon by the Corporation.

Mr. JOHN SCOBIE, of Dunfermline (the President of the Association), thanked Messrs. James Keith & Blackman and Mr. Davidson for the visit, which had been thoroughly enjoyed by everyone, and also expressed the thanks of the Association to Convenor Alexander Bruce for his welcome on behalf of the Corporation. He congratulated them on the low price of gas, considering the enormous distance the coal had to travel, and taking into account their handicap in having to cart their coal from the railway siding to the gas-works.

Provost CHAPEL briefly replied, and the party started out on their inspection of the gas-works under the guidance of Mr. Young and his chief assistants.

ARBROATH GAS-WORKS.

The existing works is on the original site, but practically all the plant of 28 years ago has been replaced or added to; consequently the general arrangement from the lay-out point of view is not what would be expected if placed on new ground. There is, however, plenty of room to admit of easy and economical working. The works are greatly handicapped by being almost a mile from the railway siding. On the other hand, the laying down of new plant in the present position rather than on an entirely new site has resulted in very low capital debt at this date.

The plant laid down since 1902 has generally been designed for an output of 1 million c.ft. per day. The vertical retort bench, which was put under fire in July, 1914, is on the Wilson intermittent continuous system, and was erected by Messrs. R. & G. Hislop, Paisley. The retorts are continuously "steamed" at 30 lbs. through a $\frac{3}{16}$-in. nipple for each retort.

The method of extracting the charge is simple. The bottom mouthpieces of the retorts are closed and sealed by a swinging cast-iron "cradle" containing a water seal, and these are opened and closed by hydraulic power. When a retort is to be drawn a bogie is placed below it and the cradle swung back. The charge in the retort falls into the bogie, which supports the whole weight of the coke and coal in the retort. By closing the "cradle" again this column is sheared off, and the bogie load of coke is then wheeled out and tipped into the coke yard.

The gas produced per ton of coal used last year was 15,780 c.ft. of 450 B.Th.U. The total debt on the gas-works in 1902 was £56,000, equal to 18s. 6d. per 1000 c.ft. accounted for, and is now £24,000, equal to 2s. 6d. per 1000 c.ft. accounted for. The annual manufacture in 1902 was 60 million c.ft., and for the year ended May 15 last it was 194 million c.ft.

Bolton's Tribute to Oldham's Efficient Street Lighting.

On Feb. 11 the Bolton Lighting Sub-Committee, with the Lighting Superintendent (Mr. R. Taylor), visited Oldham to inspect the street lighting.

They were welcomed by the Mayor (Councillor Crabtree) and Councillor Shorrocks (Chairman of the Lighting Committee).

The party, having undertaken a fairly comprehensive tour of the streets, returned to the Town Hall. Here Councillor Shorrocks expressed the hope that the visitors had been impressed by the Oldham street lighting. He stated that many compliments had been paid to Oldham, particularly by motorists passing through the town, for the good lighting. He also mentioned that originally the Watch Committee had charge of the street lighting, and observed that credit was due in a large extent to the Superintendent (Mr. I. H. Massey) for the work and thought he had put into the Department, which was a credit to himself and to the Committee which he represented.

Councillor Demain (Chairman of the Bolton Lighting Committee) passed a high tribute to the street lighting. He mentioned that at the last annual conference of the Association of Public Lighting Engineers Mr. Massey had stated that Oldham was one of the best lighted towns in the north of England. At the next conference, if Mr. Massey again made that statement, he would support it, because he had had a practical demonstration.

The Chief Constable of Oldham (Mr. A. K. Mayall) mentioned that street accidents had decreased during the past three years, a circumstance which he attributed to the good lighting of the borough.

How the Federation of British Industries View the Coal Mines Bill.

The following statement has been adopted by the Grand Council of the Federation of British Industries:

The "F.B.I." has had an opportunity of carefully considering the further proposals of the Government in regard to the Coal Mines Bill, and desires to protest in the strongest possible manner against the principle of Government interference with the internal affairs of industry, upon which they are founded.

The Federation has already expressed its intense dislike of the bureaucratic powers conferred under Part I. of the Bill in connection with the production of marketing schemes. These objections are intensified by the proposals for compulsory amalgamation of undertakings in the industry, under which the Coal Re-organization Commission is to be given powers to compel amalgamations, whether the undertakings concerned agree or not.

These proposals constitute an attack upon the fundamental rights of property. For the first time the control and direction of industrial undertakings are to be removed from the shareholders or proprietors who own them, and are submitted to the final arbitrament of a body of men who, however eminent, cannot possess the necessary knowledge of local or personal conditions which is essential if any amalgamation is to meet with success. No appeal from their proposals is allowed upon any question of principle; no weight need be given to any representation made to them; they are to work free of all responsibility to anyone, least of all to the shareholders of whose property they are disposing, and their decisions are given the force of law.

The proposals are apparently based on the belief that amalgamation is a panacea for all ills, and that, however contrived, it must automatically result in an increase in efficiency, whereas long experience in many industries and many countries has shown that amalgamation, even when carried out voluntarily under favourable conditions, is frequently unsuccessful, and that unsuccessful amalgamations are the cause not only of heavy loss to the shareholder, but frequently of increased cost to the consumer.

Successful amalgamation depends upon exceptional ability and long experience in an industry, combined with a careful selection of the particular units to be amalgamated, based upon an intimate knowledge of their characteristics and requirements. No three men, however gifted, can possess this intimate and detailed knowledge of the whole of an industry of the magnitude, variety, and complexity of the coal industry.

Yet the Government's proposal expressly provides that where intimate knowledge and long experience have decided against amalgamation, it may be over-ridden without appeal by this Commission, the whole terms of whose appointment must bias them in favour of amalgamation at all costs.

There seems every probability that the Government's proposals will saddle the country with a number of ill-assorted and unwieldy conglomerations whose inefficient operation and ultimate collapse will merely cause loss to the shareholder, and unnecessary cost and inconvenience to the consumer of coal.

The Federation desires to protest emphatically against once more allowing political exigencies to endanger the position of an industry which is fundamental to the whole fabric of British industrial existence. The result of Government interference with the industry in the past is no recommendation of this unprecedented form of intervention, which is based upon a principle against which the whole of British industry wholeheartedly protests.

Gas Supply to Small Property in Birmingham.

The Birmingham Gas Committee in a report to the City Council refer to the progress made with the scheme for giving supplies of gas to court and terrace property. It will be recalled that in July, last year, the Committee outlined a scheme they had put into operation for providing the amenities of a gas supply in the courts and terraces and other small house property in the Gas Department's area, the cost of installing the necessary internal house pipes, &c., being paid through the medium of the automatic meter over a period of time. The scheme proved extremely popular, and since its inception, on March 8, 1929, up to Dec. 31 last, 12,206 applicants had signed the requisite agreements. Practically the whole of these installations had been completed, and the work involved, together with that usually experienced by the undertaking in the winter months of the year, had been so great that the resources of the Department had been taxed to the utmost. The new scheme did not interfere with the old arrangement whereby landlords were encouraged to fit their houses for gas. It was anticipated that during the next few months practically every court and terrace property in the City would have gas at their disposal for lighting and cooking.

As to the new scale of gas charges (already published in the "JOURNAL"—see Vol. 189, p. 42), Alderman LLOYD (Chairman of the Gas Committee) stated that with few exceptions it had met with public appreciation. The concessions made meant a reduction in the revenue of £75,000 per annum. Of 255,491 consumers, less than 1 p.ct. would be adversely affected.

Councillor LEWIS inquired whether the Gas Committee proposed to abolish the present system of giving so much work to private contractors. He failed to see that the master gasfitters took any risk, as they worked on guaranteed prices.

Alderman Sir WILLIAM BOWATER expressed the opinion that when the gas undertaking was acquired fifty or sixty years ago—largely through the instrumentality of Mr. Joseph Chamberlain—one of the chief reasons given for municipalization was that the Department would make a grant, from profits, to the relief of the rates.

Alderman J. B. BURMAN inquired what the effect, of an increase of 1s. per ton on coal, would be upon the revenues of the Department.

Councillor THACKER, who stated that he was no longer a master gasfitter, made a plea on behalf of the gasfitters, and of the policy of the Department in providing them with work. In the old days, he said, the master gasfitters did a substantial business in the sale of gas cookers and fires, but this had practically come to an end since the development of the hire-purchase business by the Gas Department; and it was only reasonable that gasfitting work should be given to the private gasfitting firms. Moreover, there was mutual advantage about the present arrangement.

Alderman LLOYD, in reply, stated that the Birmingham Gas Committee could not cheapen the price of gas because of the high price of coal. They had to pay a much greater figure than formerly, and, in addition, the revenue from residual products was substantially lower. The employment to a reasonable extent of gasfitting sub-contractors was a convenience to the Department and certainly helped the gasfitters. Without their services they could not have made such good progress in the installation of gas in small houses. The amount involved by an increase of 1s. per ton on the price of coal was £45,000.

Alderman J. H. LLOYD presented the report of the Committee, and referred to the Act of Parliament which provided that the sale of gas should be at cost price to consumers without any contribution to the rates. Permission had also been given by the Act to increase the reserve fund to £200,000. It was felt that £100,000 was too small a reserve for so large an undertaking.

The report was adopted.

Chairman of Electricity Committee Congratulates Shrewsbury Gas Company on Its Progress.

The Mayor of Shrewsbury (Mr. C. S. Woollam), who is also Chairman of the Shrewsbury Electricity Committee, as one of the guests attending the staff "social" of the Shrewsbury Gas Light Company, held on Feb. 13, congratulated the Company on its progressive methods.

Mr. C. M. D. Belton, Engineer, Manager, and Secretary of the Company presided; and, in proposing the health of the Mayor, said that the staff of the Gas Light Company had all tried to give their best services for the benefit of the Borough; and he was sure they were appreciated.

The Mayor, in responding to the toast, recalled that Mr. Hearn, the Chairman of the Company, was an honoured ex-Mayor of that Borough. As he (the speaker) was Chairman of the Electricity Committee, they might be inclined to regard his presence that evening with some suspicion, but he could assure them that in that capacity he was there in a thoroughly chastened mood. [Laughter.] To him it was a source of satisfaction that the gas industry of the town should be in the hands of a Company which showed much enterprise and public spirited outlook. For many years to come there would be room for both gas and electricity.

Mr. C. Crane proposed "Our Guests." The staff, he said, were very grateful for the interest taken in them by the Directors.

Mr. A. E. White (Principal of the Shrewsbury Technical College) proposed the toast, "The Shrewsbury Gas Light Company." The past year, he said, had been one of steady progress for the Company, but that was what they might expect under their Manager and Secretary, Mr. Belton, with the loyal support of his staff. Then, of course, they were fortunate in their Board, who were rendering splendid service to the community.

Mr. H. J. Hearn, responding, said he agreed with the Mayor that there was room for both the electricity and the gas undertakings. The Directors of the Company realized that their Manager and staff were doing their very best for the consumers, as well as the Company. He trusted that within the coming year they would be in a better position to serve the public than they had been in the past. They had taken over a property close to their works, which in due course they would develop, and in that way make the conditions for those who worked and those who superintended in that department far better than they were to-day.

The Engineer and Manager of the Reading Gas Company on Political Interference in Industry.

The workmen of the Reading Gas Company held their annual dinner at Palm Lodge, Reading, on Feb. 8—the Engineer and Manager of the Company, Mr. D. H. Helps, presiding.

Mr. L. A. Rumble, in proposing the toast of the Chairman and Directors of the Reading Gas Company, said the air was full of talk about industrial welfare, and he knew the Directors did everything possible to ensure that all their employees were happy and contented. It was up to all of them to put their shoulders to the wheel, and so help the Company to sell gas cheaply, thus creating an increasing demand for it.

Mr. D. H. Helps, replying on behalf of the Directors, said that during the past year they had certainly had a busy and interesting time. Last September the price of gas was again reduced. He was beginning to wonder whether the reduction was a little premature; in any case, if the Coal Mines Bill became law, it would lead to an increase in the price of gas not only in Reading but throughout the country. He looked upon this question not as a matter of politics, but as a matter of business which concerned all those present, more particularly as they were in the employ of a Gas Company. The working man would be hard hit by the Bill. In the opinion of those best able to judge, it would increase the cost of living; it would increase the cost of production of British made goods, and it would assist foreign manufacturers still further to compete successfully with British made goods. He had read that if some of the Members of Parliament who voted for the Bill had done so according to their own judgment, and without regard to party, the Bill would never have received a second reading; as it was, it only passed by a majority of eight. He was glad to see that an increasing number of the public were beginning to realize that politics were interfering far too much in industry.

A vote of thanks to the Chairman was proposed by Mr. E. J. Likeman, and seconded by Mr. C. H. Eves.

Mr. Helps, in reply, said: "Gas is not yet 'down and out,' as some people would have us believe. I have been in the gas industry for many years; and I have never known too large a holder to be built or too large a gas main to be laid. The gas industry has a great future if it is only left untrammelled by unnecessary and grandmotherly legislation, and providing its competitors are not spoon-fed by the Government."

National Gas Council.

Meeting of the Central Executive Board.

The Central Executive Board of the National Gas Council met on Tuesday, Feb. 11, at 28, Grosvenor Gardens, S.W. In the absence of the Chairman (Sir David Milne-Watson), the Chair was taken by Mr. J. H. ELLIS (Vice-Chairman).

Before commencing the business of the meeting, the Chairman tendered to Sir William Whyte the congratulations of the Board on the honour of Knighthood recently conferred upon him by H.M. the King.

COAL MINES BILL.

The steps taken by the Council to oppose Part I. of the Bill were reported. The hope was expressed that Part I. would be withdrawn *in toto*, as it did not appear to be capable of amendment so as to afford adequate protection to consumers.

AREA GAS SUPPLY COMMITTEE.

A further meeting of the Area Gas Supply Sub-Committee of the National Gas Council, held at Leeds on Feb. 4, was reported, and it was stated that evidence on behalf of the gas industry would be heard on Monday, Feb. 24, and, if necessary, upon the following day.

LOW-TEMPERATURE CARBONIZATION.

It was reported that representatives of the Scottish gas undertakings had met a Committee of the Royal Sanitary Association of Scotland on Jan. 17 to discuss the attitude of the gas industry to the question of low-temperature carbonization. The Scottish representatives had assured the Committee that there was no objection whatever on the part of the gas industry to the production of smokeless fuel, and that gas undertakings had been engaged in the production of such fuel, in both solid and gaseous form, for over one hundred years.

They had pointed out that the problem of low-temperature coke production as compared with the present practice of high-temperature coke production was not technical but economic, and that if and when it were shown that the demand for low-temperature coke at the price at which it would have to be sold was likely to be sufficient to make its production an economic proposition, low-temperature coke would be generally available.

The representatives of the gas industry had readily undertaken to prepare for the Congress of the Royal Sanitary Association which was to take place on Sept. 11 next in Edinburgh, a Paper dealing with the whole question of the economics of smokeless fuel production.

RESTRICTIONS ON THE USE OF GAS IN COUNCIL HOUSES.

It was reported that a great deal of information on this subject having been obtained by the Sub-Committee of the Council set up for the purpose, the Managers had had an interview with the officials of the Ministry of Health, who had consented to receive a full memorandum on the question. This would be forwarded at an early date.

CONJOINT CONFERENCE OF PUBLIC UTILITY ASSOCIATIONS.

It was reported that, at a meeting of the Conjoint Conference held on Jan. 29, the following matters had been discussed:

(*a*) *Rating and Valuation.*—A memorandum had been sent on behalf of the gas and electricity industries to the Central Valuation Committee, stressing certain difficulties which had arisen in practice with regard to valuations under the Rating and Valuation Act, 1925. Among these difficulties, the foremost were those dealing with undertakings which extended into the area of more than one rating authority. It had now been decided that a deputation, representing the gas and electricity industries, should wait upon the Central Valuation Committee on the 28th instant, for the purpose of amplifying the memorandum. The water interests would also be represented at the deputation, though they were putting forward a separate memorandum.

(*b*) *Usurpation of Footpaths by the Post-Office.*—This question dealt with the right of the Postmaster-General to place manholes under footpaths, and thus render it impossible for the sub-surface works of public utility undertakings to be placed under such footpaths. A considerable amount of information had been obtained by the gas, electricity, and water interests regarding this matter, and it was understood that the question was already under negotiation between the Highway Authorities, the Association of Municipal Corporations, and the Institution of Municipal County Engineers. It had, however, been decided that a letter on behalf of the Conjoint Conference should be sent to the Postmaster-General, pointing out that while, generally speaking, public utilities received consideration from the Post-Office engineers, specific instances had been reported from various parts of the country where a different attitude was adopted.

(*c*) *Stamp Duties.*—The Conference had decided that the Chancellor of the Exchequer should be approached with regard to certain amendments of section 55 of the Finance Act, 1927, which gives exemption in certain cases from capital and transfer duties payable on amalgamations.

DISPOSAL OF EFFLUENT.

It was reported that joint evidence had been given before the Joint Advisory Committee on River Pollution, which had been set up by the Ministry of Health and the Ministry of Agriculture and Fisheries, on behalf of the National Gas Council by Mr. L. F. Stamp, and on behalf of the Institution of Gas Engineers by Mr. Chas. F. Botley, M.Inst.C.E.

SUPPLY OF ELECTRICITY TO PRIVATE CONSUMERS BY THE WAR OFFICE.

It was reported that the Army Council were supplying electricity to private consumers in the Bordon district at a price at which no statutory undertakers could compete commercially, and it was agreed that the matter should be taken up with the War Office forthwith.

Deaths from Gas Poisoning.

Report to the Board of Trade by the Departmental Committee.

The Report has been published (H.M. Stationery Office, price 6d. net.) of the Departmental Committee (consisting of the Rt. Hon. Sir Evelyn Cecil, G.B.E. (Chairman), Sir John Robertson, C.M.G., O.B.E., M.D., Prof. Richard Vernon Wheeler, D.Sc., F.I.C., and Mr. Frederic John Wrottesley, K.C.) appointed by the President of the Board of Trade "to consider the increase during recent years in the number of deaths ascribed to poisoning by coal gas supplied for domestic purposes, and to make recommendations as to any measures relating to the production and use of gas for domestic purposes which might be taken with a view to diminishing the number of such deaths."

NUMBER OF DEATHS ASCRIBED TO COAL GAS POISONING.

The number of deaths in Great Britain ascribed to coal gas poisoning, by accident and suicide respectively, is shown below for the years 1918 to 1928:

Number of Deaths Ascribed to Coal Gas Poisoning in Great Britain during the Years 1918 *to* 1928.*

Year.	Accident.	Suicide.	Total.
1918	102	193	295
1919	115	231	346
1920	114	299	413
1921	126	392	518
1922	203	558	761
1923	155	754	909
1924	106	673	779
1925	135	841	976
1926	200	1068	1268
1927	178	1116	1294
1928	168	1191	1359

* Taken from figures supplied by Dr. Stevenson, of the General Register Office, Somerset House, and the Registrar General for Scotland.

It has been suggested to us by Dr. Stevenson that the excess of suicidal over accidental deaths is even greater than that indicated by these figures, as the accidents include deaths which may have been suicidal, the evidence at the inquests not sufficing to decide this point. The number of such doubtful cases tends to vary in proportion to the increase shown in recorded suicides, and accordingly some of the deaths classed as accidents are really cases in which there was great likelihood of suicide, but the jury or the coroner (as the case may be) were not prepared to give a definite verdict to that effect. It is probable also that in a certain number of cases a sympathetic view has been taken, and a definite verdict of accidental death recorded, where it was not justified by the evidence given at the inquest.

Support is given to this view by the fact that, out of 1026 cases of death from gas poisoning in England and Wales, reports of which have been specially investigated by the Board of Trade during the last eight years, no fewer than 602 were proved to be due to gas taps being found open with, in many cases, no adequate reason. We are also informed by the Registrar-General for Scotland that a marked rise in the number of accidental deaths in Scotland during the year 1922 (which largely accounts for the increased total for Great Britain shown for that year) led to special steps being taken in subsequent years to ascertain whether the deaths were in fact due to accident. This action resulted in a marked fall in the number of deaths registered as accidents in Scotland, with a corresponding increase in the number of deaths registered as suicides.

In considering any increase in the number of actual accidents, regard must be had to the large increase in recent years in the number of gas consumers. According to the Returns issued by the Board of Trade, 236,000 million c.ft. of gas was supplied to 7½ million consumers in 1920, while, in 1928, 283,000 millions was sold to nearly nine million consumers.

The Board of Trade inform us that the number of recorded accidental deaths for the year 1929 is likely to exceed the average figure for the last three years. It may be that (except so far as the excess is due to cases of suicide included among those attributed to accident) this is accounted for by the excessively cold weather experienced in the early part of that year. Thus, a number of the accidents reported to the Board of Trade during the first three months of the year 1929 appear to have been due to fracture of mains and fittings and to other mishaps caused by the abnormal frost.

SUICIDE BY GAS POISONING.

While the rate for suicide in England and Wales from all causes, taking males and females together, has returned to the same level as that which obtained in the years prior to the war, nearly all the increase which has occurred since the low rates registered during the war* has taken the form of suicide from coal gas poisoning. In the past, drowning has been the most common means of suicide, but gas poisoning now heads the list. Every witness who has dealt with this matter has considered that the publicity given to cases of suicide by gas poisoning has been the cause of the adoption of this means of suicide, through suggestion and imitation; and it has been urged that the publicity afforded to such cases should be checked. In illustration of the danger of publicity, reference has been made to the number of cases in recent years of suicide by taking "Lysol" and aspirin after publication of instances of the use of those substances—and this notwithstanding that in the case of "Lysol" the death is a most agonizing one.

We have been at some pains to ascertain whether the easy accessibility of gas causes persons to commit suicide who would not otherwise have done so. Sir Maurice Craig holds the view that "from a medical standpoint it has always been quite obvious that the will to die is the primary matter, and that the mode selected to obtain this end is either what appeals to the individual, or not infrequently some means that has been referred to in the newspapers during the recent period before the suicidal act;" and Dr. Ingleby Oddie, the Coroner for Westminster, told us that "people who have made up their minds to kill themselves will do so somehow, for there are always trains, rivers, lakes, windows, razors, 'Lysol,' and so on."

On the other hand, we have an indication from the figures put before us that the rate of suicide among females has increased considerably above its highest level before the war, and that the increase takes the form entirely of coal gas deaths. It would seem, therefore, that, though the use of gas as a means of suicide is largely a change of fashion, and though there may be other factors contributing to an increased suicide rate among females, the non-repellent circumstances attending the use of gas, and the accessibility of this means, may be influencing some persons, especially females, to commit suicide who would not otherwise do so.

Sir M. Craig, in his evidence before us, laid stress upon the importance of the early treatment of mental disorder as the only means by which people with a tendency to commit suicide can be helped. Many of these persons, in his opinion, are not insane, but commit suicide from the fear of becoming so. Early treatment is, in his view, the best method of dealing with these cases.

PRODUCTION OF GAS.

The only important constituent of coal gas which is toxic is carbon monoxide, and this gas is contained in ordinary coal gas to an extent varying from 5 to 12 p.ct. We have made inquiries from various witnesses as to whether it is possible commercially to remove the carbon monoxide from ordinary coal gas. We understand that some research on these lines which has taken place in Great Britain and experiments which have been made in Germany show that, at present, this could not be done without very substantially increasing the price of gas. Moreover, the development of the gas industry in the last twenty years and recent research in the science of gas manufacture show that reduction in the cost of manufacturing gas can, at present, be achieved only by means which involve an increase in the proportion of carbon monoxide. It is now the practice of the majority of gas undertakings to mix water gas with coal gas, thereby increasing the proportion of carbon monoxide. Water gas is made from coke and steam, either (i.) by a separate process, or (ii.) by a modification of the manufacture of coal gas whereby water gas is produced in the retorts with the coal gas. Carbon monoxide is a large constituent of the product obtained. It has been represented to us that method (ii.) results in the production of the cheapest gas made for domestic purposes at the present time,* while method (i.), the separate process, forms a most useful adjunct to coal gas manufacture for use in time of emergency—for example, when weather or trade conditions require a sudden increase in the production of gas, or when sufficient coal is not available to enable consumers' demands to be met by the manufacture of coal gas.

The gas industry assure us that, in making water gas from a part of the coke which results from the manufacture of coal gas, they are able to keep off the market a large quantity of coke. If the addition of water gas to coal gas were prohibited,

* It is a noteworthy fact that the Great War had the effect, during its continuance, of largely checking all forms of suicide.

* The supply of coke oven gas for domestic purposes is not here considered.

this coke would have to be offered for sale, in competition with coal and other fuels, together with the quantity of coke and tar produced during the manufacture of the coal gas required to take the place of the water gas now made. The result would be a reduction in the market value of coke and tar, which would be reflected in an increased price for gas, as the revenue obtained from coke and tar is brought into account and is an important factor in determining the price to be charged for gas.

The industry disclaim any intention of supplying regularly gas containing an excessive proportion of carbon monoxide, and they state it is unlikely that their practice of making water gas in the same plant with coal gas can economically be extended to the total gasification of the coke in large units owing to difficulties which arise in manufacture. We note, however, that a number of small plants designed for this purpose are in operation.

Question of Limitation of Carbon Monoxide.

We have carefully considered whether some limit should not be placed upon the proportion of carbon monoxide supplied in gas used for domestic purposes. This question was considered by both the Belper Committee (1898) and the Pearce Committee (1921). The Belper Committee recommended, *inter alia*, that a limit of 12 p.ct. should be placed on the proportion of carbon monoxide in the public gas supply at night, but no action was taken on their recommendation. The Pearce Committee came to the following conclusion:

> After weighing very carefully all the facts concerned, we have concluded, on the balance of advantage to the public, that we are justified in recommending non-limitation. We have not ignored the increased risk from the poisonous nature of carbon monoxide, but, when all practicable precautions are adopted, we do not consider that the increased risk will be found a serious one. The danger of increased death rate is in any case of small dimensions, and against this must be set the certain improvement in the public health by the reduction of smoke and fog arising from increased use of gas. The evidence given before us proved without doubt the economic advantages which follow the use of water gas, and we are greatly impressed by the necessity of allowing the development of the gas industry to proceed without any check on its natural progress.

The statistics which we have obtained as to accidental deaths in districts in which the proportions of carbon monoxide supplied are high and low respectively (though subject to qualifications, especially as to the inclusion of cases of suicide as referred to above) do, in our opinion, show that there is greater danger of accidental death from gas poisoning in districts where the proportion of carbon monoxide is high. In 1926, the year of the prolonged coal stoppage, many gas undertakings supplied gas containing more than 20 p.ct. of carbon monoxide, and there was an appreciable increase in that year in the number of recorded accidental deaths.

Dr. Haldane (whose great experience of carbon monoxide poisoning is well known, and who conducted experiments for the information of the Belper Committee as to the effect of escapes of gas in producing a lethal atmosphere) suggested to the Pearce Committee that, if a limit of carbon monoxide were imposed, it probably need not be lower than 20 p.ct., but he urged the desirability of further experiments on this point. In his evidence before us, Dr. Haldane doubted whether any legal limitation were needed, but suggested the making of experiments with modern gasfittings as to the influence of percentage of carbon monoxide on risk of accidental death.

We may mention here that no evidence has been tendered to us advocating limitation of the proportion of carbon monoxide in gas, and certain associations of municipal bodies which we invited to give evidence from the point of view of consumers of gas and of the general public stated that they did not desire to give evidence.

It is claimed by the gas industry that experiments by their technical advisers show that the presence of carbon monoxide makes gas more suitable for domestic and industrial purposes, and they ask that the development of the industry should not be restricted by a limitation placed upon the proportion of carbon monoxide which may be supplied in gas.

Introduction of Irritants and Odours.

We have given considerable attention to the possibility of adding substances to gas with a view to attracting attention to escapes and to making suicide by gas poisoning more repellent. Experiments on these lines have been carried out in America and elsewhere, and certain suitable substances have been chosen. There are, however, objections to the use in this way of anything which would act as an irritant by affecting the eyes, nose, or throat of persons exposed to the gas, as it would affect persons using gas in the normal manner whenever gas was turned on unlighted for even a moment, and would also affect workmen dealing with gas in the course of their employment. It is suggested, too, that the presence of an irritant would discourage the use of gas, might cause corrosion of mains and fittings, and would, in fact, have little effect in restraining persons intending to commit suicide. Also, it is probable that any such irritant could be easily removed from the gas or rendered ineffective, and that the means of doing this would soon become known.

We have considered the addition to gas of a more penetrating odour than that which it now possesses. In this connection, it has been pointed out to us that the use of an odour not now associated with gas would cause confusion, especially in the case of aged people. The Board of Trade have made an Order,* on the recommendation of the Pearce Committee, which requires all gas supplied for domestic purposes which contains carbon monoxide to possess "the distinctive pungent smell of coal gas." Witnesses who have appeared before us agree that gas as at present supplied possesses a sufficiently characteristic and penetrating odour.

Distribution of Gas.

Out of the 1026 fatalities in England and Wales attributed to accidental gas poisoning which have been examined by the Board of Trade, as previously stated, 68 have been due to escapes from gas mains and services not on consumers' premises. This number is not large in itself. These fatalities were caused by only 36 escapes of gas, but, as these cases attract public attention and are apt to involve persons who are not consumers of gas, we have thought it desirable to hear a considerable amount of evidence bearing on the subject. Representatives of the gas industry estimate the quantity of gas lost by leakage from gas mains to be on the average about 1 p.ct. of the gas manufactured, and state that the greater part of this loss is caused by minute leaks from the joints of the mains. The leakages which cause fatalities are generally due to fracture of mains through subsidence of the bed on which the main is laid, or through stresses caused by frost or through vibration from heavy traffic. The industry claim that (*a*) their methods of laying mains have considerably improved in recent years, (*b*) modern methods of road construction, while tending to make it more difficult to locate leakages, do in fact protect mains from frost and vibration, and (*c*) underground leakage is substantially less than it was twenty years ago, and is still being reduced.

The relative impermeability of modern roads prevents gas from escaping easily from the subsoil, and it finds its way either into street boxes and manholes constructed by other public utility undertakings, or escapes into, and through, pervious material at the sides of the roads. The value of street boxes and manholes acting as ventilators and detectors of gas leakages is emphasized by the gas industry, and arrangements sometimes exist whereby, if a smell of gas is detected when the boxes or manholes are opened, the gas undertaking concerned is notified so that the source of the escape may be traced. A suggestion has been made to us that ventilators should be fixed along the line of a gas main at convenient distances (say) every 50 yards, with a view to the dispersal of escaped gas; but the industry deprecate the adoption of this suggestion, and claim that this distribution of ventilators would not be effective for clearing the gas from any serious escape, as the escaping gas would not necessarily follow the line of the main, and, unless the ventilator should happen to be on the line taken by the gas, it would be useless. The escape of gas at the margins of the roads may occur at a considerable distance from the actual point of leakage, but would appear to be innocuous unless a means of access exists beneath the soil enabling it to penetrate into the houses adjoining the road. It has been suggested to us that persons making holes in the walls of houses below the ground line, when laying on public utility services to houses or otherwise, should be required to fill up the holes so made and any other spaces, such as those between wires and outer casings, so as to prevent the ingress of gas.

We have considered whether it is desirable that a certain depth of cover should be required over gas mains, but we understand that this would involve considerable extra cost and also inconvenience to other subsoil users. The representatives of the gas industry assure us that, in their experience, the safety of a main in relation to damage from traffic depends more on the foundation bed on which it is laid than on the amount of cover, provided that a sufficient cushion of earth is left between the top of the main and the actual road surface.

It is the general practice to use for gas-supply cast-iron mains which require to be laid in shorter lengths than would be the case if steel mains were used, and there might be less leakage from joints if steel mains were employed. We are advised that there is objection to the general adoption of steel mains as at present manufactured owing to their being less resistant to corrosion than are cast-iron mains.

Use of Gas by Consumers.

As already stated, the examination made by the Board of Trade of the fatalities reported to them reveals that, out of the 1026 cases examined, no fewer than 602 were caused by gas issuing from an open tap. In a small number (16) of these cases, it is clear that the victim had turned the wrong tap where two taps were close together. A somewhat larger number (22) was due to gas, left alight while the victim slept, being extinguished by the exhaustion of the supply from a prepayment meter into which coins were subsequently placed by

* The Gas (Carbon Monoxide) Order, 1922.

another person, with consequent resumption of the supply to the victim's burner. A proportion of the remainder of these cases is accounted for by sudden faintness or illness, drunkenness, forgetfulness, or shakiness on the part of an aged person, or the turning of a tap while the victim was asleep or half asleep. Other causes suggested at the inquests include:

(*a*) Absence of stop pins in lighting burners, so that the tap could be turned completely round and there was no definite "off" position.
(*b*) Taps too loose.
(*c*) Taps turned on when articles were hung on the gas bracket or removed therefrom.
(*d*) Taps near the floor kicked or knocked when furniture was moved.
(*e*) Kettles or saucepans boiling over and extinguishing the gas.
(*f*) Absence of the sense of smell on the part of the victim.

In the period under consideration, 73 deaths were accounted for by the disconnection of flexible tubing or by such tubing becoming defective. Deaths definitely due to defective pipes, fittings, and meters numbered only 93.

Evidence was given by the gas industry that, to a large extent, gasfitting is now carried out by fitters employed and trained by the gas undertakings, that the materials used are examined and tested, and that not only is the use of unsuitable types of fittings, pipes, and connections avoided, but steps are taken to discourage their use by private individuals. As an example of this, it may be mentioned that, during the last eight years, fourteen deaths have been due to escapes from sliding gas chandeliers—a type of fitting largely used at one time. The pressure at which gas undertakings are now required to supply gas has rendered the use of this type of fitting exceedingly dangerous. Steps have been taken by gas undertakings to eliminate it by converting the fittings to a non-sliding type wherever possible. One undertaking does this work at its own expense, and a reward is offered to any employee who detects and reports the continued use of such a fitting. Despite this action, nineteen sliding chandeliers still exist in the area of that undertaking. In these cases, the owners, after repeated overtures, persist in retaining the fitting.

According to the evidence there are several million houses throughout the country where the entire gas installation is the property of, and has been installed by, the gas undertaking, which has frequent opportunities of ascertaining whether the apparatus is being maintained in a satisfactory condition. In other houses, some at least of the apparatus is the property of the gas undertaking and is periodically examined, tested, and, if necessary, adjusted by men employed by the undertaking.

Gas undertakings have, in large numbers, voluntarily instituted a systematic inspection of gas-burning apparatus in consumers' premises, and the gas industry point out that it is very largely to their interest to take the steps necessary to prevent unfortunate occurrences from the use of gas. Mr. Butterfield in his Report (1924) remarks that "the inspection periodically and maintenance of gas piping, fittings, and appliances by the gas undertaking reduces enormously the risks of gas poisoning in all premises to which the system is applied."

Deaths Due to Products of Combustion.

There is one type of fatality included in the number of accidents attributed to gas poisoning to which special prominence has been given during the course of our inquiry by the death of two persons at Carshalton. In cases such as these, death is due not to the effects of carbon monoxide contained in unburnt gas, but either to asphyxiation by the ordinary products of the combustion of gas, or to poisoning by carbon monoxide produced during incomplete combustion of the gas. In the latter case, the carbon monoxide is formed either because the air supply is insufficient to burn the quantity of gas issuing from the burners, or because the apparatus is improperly adjusted.

Deaths from these causes occur generally in connection with the use of geysers. Our attention was called to the fact that geysers are frequently installed either with no flue, or with a flue which is not efficient, and that sufficient ventilation is not provided for the confined spaces in which the apparatus is fixed. A representative of one gas undertaking informed us that about 60 or 70 flueless geysers are fixed in houses in the area of that undertaking and that, in the case of one geyser where a death had been caused, the owner refused to alter it, and a second death resulted from its use. Our attention was also called to an advertisement in the Press of a geyser in which no provision is made for a flue. We have reason to believe that flueless geysers are frequently installed in small bathrooms, and we understand that, in some towns, special powers have been obtained to make by-laws to provide for the efficient ventilation of geysers and the rooms in which they are installed. We have inspected a type of flue which is designed to prevent the products of combustion (or incomplete combustion) of gas in a geyser from being blown back into a bathroom whatever the wind conditions may be.

Safety Devices.

We have also had brought to our notice a number of devices, such as safety taps, which have been designed with a view to making the use of gas safer. While we are assured that these devices are studied and tested by the gas industry and the makers of gas appliances, their existence does not seem to be generally known, and we feel that much more might be done in searching for, and investigating, inventions of this kind.

CONCLUSIONS.

As a result of our inquiry, we have come to the following conclusions:

(1) While the number of deaths by suicide from coal gas poisoning in Great Britain in recent years has shown a large and disquieting increase, the number of accidental deaths from such poisoning shows, on the whole, no appreciable increase, and remains at a figure which, we consider, gives no cause for alarm.

(2) We believe that, to a large extent, the increased number of gas suicides denotes merely a change in the suicidal means adopted. We are satisfied that it is not consequent on an increase of carbon monoxide in gas supplied for domestic purposes, for the proportion of carbon monoxide in ordinary coal gas is quite sufficient to permit of its use as a means of suicide, and many of the cases of suicide reported are, in fact, effected with coal gas to which no carbon monoxide has been added. We are unable to suggest any effective measure relating to the production and use of gas whereby the tendency to commit suicide by gas poisoning may be checked, without imposing on the whole body of gas consumers a financial burden or other inconvenience which, in our opinion, is not justified. Against any increased number of suicidal deaths which may be directly due to the use of this agent must be set the admitted advantages accruing from a supply of cheap gas to many millions of households throughout Great Britain.

In these circumstances, we feel that the prevention of suicide by gas becomes part of a larger question of preventing suicide by any method which is easily accessible to the public, and that the points to which we have referred regarding the publicity given to suicide cases and the early treatment of mental disorder would need consideration on a wider basis than that contemplated by our terms of reference.

(3) We do not think that the extraction of carbon monoxide from ordinary coal gas is practicable at the present time. On the other hand, we accept the view that the new manufacturing processes involving an increase of carbon monoxide tend to reduce the cost of producing gas. In view, therefore, of the economic and social benefits which follow the supply of cheap gas, we think that no general prohibition or limitation should be placed upon the supply of carbon monoxide in gas at the present time.

(4) We are agreed that the addition to gas of substances designed to act as irritants or to give to gas a distinctive penetrating odour not now associated with coal gas is neither desirable nor necessary having regard to:

(*a*) The relatively small number of fatal accidents caused by gas compared with the large number of persons exposed to the danger of gas leakage.
(*b*) The probability that intending suicides either would not be deterred thereby, or would seek, and find, some other means of suicide.

(5) We think that the question of ventilating the subsoil in streets in which gas mains are laid, with a view to detection of gas leakage, is one deserving the further attention of the gas industry, instead of their relying on chance detection by means of works constructed by other bodies for their own purposes. Such a system, however, may not be of great practical use, and may involve danger, and the cost of introducing it may be prohibitive. In these circumstances, while commending the matter to the attention of the gas industry (especially in cases where the houses bordering on a street of impermeable nature are not of modern construction), we refrain from making a recommendation in the matter.

(6) The possibility of gas entering houses through walls by way of holes below the ground surface ought to be avoided as far as practicable if this can be done without undue cost or delay to work carried out by public utility undertakings and others.

(7) We accept the view of the gas industry with regard to the depth of cover over gas mains, recognizing that it is so largely to the interest of an undertaking to protect its mains sufficiently that, wherever possible, adequate cover will be allowed.

(8) The objection to the use of steel mains in certain circumstances is a vital one, but we think that gas undertakings should consider their use, wherever practicable, with a view to reducing the number of joints from which gas can escape.

(9) We appreciate, from what we have heard in evidence, and from apparatus and fittings which we have inspected, that much is being done by some gas undertakings to ensure that the types of gas apparatus used by consumers shall be satisfactory from the point of

view of safety, and that the material and method of construction of pipes, fittings, and other apparatus are carefully examined. We are not satisfied that all undertakings are sufficiently alive to the necessity for similar action on their part, with a view to preventing accident and to making the use of gas safer and, therefore, more popular. We think that it might be found possible to make arrangements within the industry whereby the work done in this way by the larger and more efficient undertakings could be extended for the benefit of the consumers of gas supplied by other undertakings.

(10) We think that much could be done by makers of gas apparatus and by gasfitters (whether employed by gas undertakings or not) to prevent mistakes in the use of gas taps, and to avoid the placing of taps in positions where they can be easily turned on accidentally and unnoticed by the occupants of the room. Also, in designing gas apparatus, makers should have constant regard to the prevention of accident.

RECOMMENDATIONS.

We accordingly make the following recommendations:

(1) That the Board of Trade should continue to keep themselves informed as to the number and nature of fatal accidents recorded as due to gas poisoning and as to the percentages of carbon monoxide in gas supplied for domestic purposes, with a view to their applying to Parliament for powers to limit, either generally or in particular cases, the percentage of carbon monoxide in gas supplied for domestic use if the results of their inquiries should at any time show that this is desirable.

(2) That a series of experiments on the lines suggested by Dr. Haldane should be carried out, with a view to obtaining and making known accurate information as to the toxicity of gas as now supplied for domestic purposes should it escape from modern gas pipes and gasfittings.

(3) That a central body consisting of representatives of the various branches of the gas industry and of representatives of manufacturers of gas pipes, apparatus, and fittings should be formed to institute and encourage research into, and to collect information regarding, means of rendering gas non-toxic and, generally, of improving the safety and efficiency of the apparatus used in the distribution and supply of gas. The information obtained by this body should be made available, at frequent intervals, for the use of individual gas undertakings and makers of gas apparatus.

(4) That conferences should be held, at not longer than annual intervals, between representatives of the Board of Trade and of the central body to discuss questions relating to the production and supply of gas from the point of view of the safety of the public.

(5) That gas undertakings which have not already done so should be urged to establish a system of voluntary inspection of consumers' gas apparatus, with a view to detecting unsafe, badly adjusted, and improperly ventilated apparatus, and warning the consumer of the danger of its use. If it should be found, by experience, that consumers refuse to act on warnings of this kind, steps should be taken to empower the undertaking to cut off the supply until the danger is removed.

(6) That steps should be taken, by by-law or otherwise, to provide:

(*a*) That where a hole is made for any purpose under the ground, through the wall of a new building or an existing building, the person executing the work shall stop up any resulting aperture so as to prevent the free passage of gas into the building.

(*b*) That geysers shall be properly fixed and adjusted, and that both the apparatus and the room in which the apparatus is fixed shall be adequately and efficiently ventilated. It should be made unlawful to instal or maintain a geyser without a proper flue.

(7) That, as a safeguard against fatalities caused by the escape of gas from street mains, the police should be instructed to report immediately, to the gas undertaking concerned, any unexplained gas escape which may be noticed in the street, and to use their discretion in giving warning to persons in the vicinity of the escape who may be asleep.

The Committee desire to record their recognition of the services of Mr. H. L. Spencer as Secretary.

Light in Sickness and Health.

A lecture on this subject was given recently by Mr. E. F. Keable, Engineer and Manager to the Gorleston and Southtown Gas Company, before the Great Yarmouth Rotary Club. What follows is an extract:

City life has imposed upon man all the restrictions linked with the herding together of large masses of people shut away from the sun between four walls, in which condition most of his time is spent. It is a known fact that many of our densely populated industrial areas are perpetually under a smoke pall which results in the cutting-off of anything up to 60 p.ct. of the most vital rays.

In an area like our own, we do not appreciate what such existence means; but I am sure that as Rotarians we shall support our Town Council and all work throughout the country which is aiming at removing what Dr. Saleeby, the Chairman of the Sunlight League, calls the "diseases of darkness" by transferring crowded populations into sunshine and fresh air; and one is pleased to note such a movement in our midst. The London papers recently recorded the fact that in three years 600,000 people have moved out of London into the suburban areas; and these will get a fuller share of Nature's gift.

As recently as November last Dr. Saleeby declared that the miracles performed by sunlight and fresh air at Dr. Rollier's famous clinic in the Alps can be accomplished in our own despised climate. He went on to say that the Sunlight League had recently taken figures of ultra-violet light in seaside towns, and the figures were larger than those obtained in the Alps; and if proper facilities were given for sun bathing in England, it would have an enormously beneficial effect on the national health.

VALUE OF TRUE SUNLIGHT.

Let us make full use of the sun first, for no one who has really seen, and lived with, the true sun-cure can share for a moment the stupid, ignorant, and disastrous belief, common not only among the public, but also in the medical profession, that the ultra-violet rays are the only curative constituent in sunlight—a belief which leads to deplorable consequences when such rays are tested and found wanting, and real sunlight is thereupon discredited. Prof. Rollier's formula is "the whole sunlight upon the whole skin;" and it works wonders. To put the matter in a nutshell, what is the use of having ultra-violet rays make vitamin-D in your skin if meanwhile, for lack of infra-red rays, you have frozen to death. For health and safety sake it is no less necessary to receive infra-red rays, as in real sunlight, than it is to receive ultra-violet rays, as in real sunlight also.

It is therefore desirable that we should turn our attention to the part that these infra-red rays are destined to play when administered in conjunction with ultra-violet ray treatment, not only in the fight against disease, but in the greater service of the fortification of our bodies against disease.

THE GAS INDUSTRY'S SERVICE TO MANKIND.

During the last 25 years we have reduced the smoke of our towns and cities by the fixing of millions of gas cookers and fires, and it has been independently stated that during this time fogs have been halved and the period of visible sunshine doubled; but not content with this great service to the community, the research departments of our Institution and of the manufacturers took up the question of the possibility of gas proving to be the medium for the production of infra-red rays, which constitute 80 p.ct. of real sunlight.

A special Research Committee of the Institution of Gas Engineers was formed to explore the subject fully. They have had the services on the Committee of Sir Henry Gauvain, M.D., of the Treloar Cripples' Homes at Alton, and the added advantage of the practical application of their findings in the treatment of large numbers of children in these homes. This work is proceeding with beneficial results, and our laboratory staffs are actively adding to the knowledge already acquired which will from time to time be placed at the disposal of our consumers. It will be understood that the full value of the new treatment cannot be tabulated in a few months; it may even take several years. But it is clear that we are on the right road, and, as in all valuable research, we must wait patiently if we desire the best results from such labours.

Ultra-violet rays are cool or cold, and not heavily laden with energy. In a cold room, we require some help from other rays to keep us warm. We must go in the opposite direction, past the indigo, blue, green, yellow, and orange, to the red limit of the visible.

INTRODUCTION TO INFRA-RED RAYS IN MORE DETAIL.

This naturally leads me to my references to infra-red rays, which are being fully investigated by the industry which I have the honour to serve, supported by a number of leading medical and scientific men.

The three main sources of radiations produced from gas which are under investigation are: (1) From the daylight

mantle; (2) from the daylight mantles with suitable filters; and (3) from gas fire radiants.

These have been placed at the disposal of Sir Henry Gauvain in order that, by correct blending in conjunction with ultra-violet light, electrically produced, he may experiment upon the cases under his care.

To maintain the warmth of the blood is a chief function of our food. We consume starch and sugar, which are oxidized, yielding heat necessary for the lives of all warm-blooded creatures. The short infra-red rays exercise this function without any effort of digestion, absorption, and so forth. In this manner, who sun-bathes dines; and these rays are a skin food.

It will be clear that both the electrical and the gas industries are destined to play a great part in the future as the value of this treatment becomes wider understood. I make bold to state that in this way, as in many other ways, the future will see these two great industries working in much closer co-operation in the service of generations yet unborn.

London Juniors Annual Dinner and Concert.

The Seventeenth Annual Dinner and Concert of the London and Southern District Junior Gas Association was held at the Holborn Restaurant, Kingsway, W.C. 1, on Friday evening, Feb. 14. The members and their friends were welcomed by the President of the Association, Mr. F. S. LARKIN, Assoc.M.I.Mech.E., and Mrs. Larkin. The occasion was marked by the presence of many well-known figures in the industry, including Mr. John Terrace (immediate Past-President of the Institution of Gas Engineers), Mr. R. W. Foot (General Manager of the Gas Light and Coke Company), Mr. J. R. W. Alexander (the Secretary of the Institution), Mr. E. V. Evans (Joint Manager of the South Metropolitan Gas Company), Mr. D. Cleave Cross (Engineer of the Lea Bridge District Gas Company and a Past-President of the Junior Association), and Mr. H. C. Smith and Mr. S. B. Chandler (of Tottenham).

After the Loyal Toast had been honoured, on the proposition of the President,

Mr. TERRACE rose to submit "The Association and the President." In the absence of the President of the Institution of Gas Engineers (Mr. C. S. Shapley), he said he had been honoured by being asked to do so. They had at school to write essays on "The Boy is Father to the Man." And the Junior Gas Associations were provided for those who had not yet been able to attain higher ranks; but their work was just as necessary. The London Juniors had been very fortunate. They had been well helped by the Seniors, and the Seniors had reaped their reward. The remarks he had wanted to make were of this nature. While in the early days this Association was formed to interchange views and experiences, nevertheless, though at the present time much printers' ink had been spent, the whole of the objects of an association like this did not lie in the provision of matter for publication, but also in affording opportunities of discussing the matters which had been put before the meetings, and of meeting their friends and exchanging views. When he was very much younger, continued Mr. Terrace, he was accused of wasting much time in seeing commercial travellers. But in discussing business with them, they often struck a new train of thought which, on being put into practice, resulted in benefit to the work. Their meeting together had a great advantage in that they were all working towards something for the benefit of the gas industry, and though the discussions in which they had taken part might not always have seemed to add very much at the time, they would be able to see many years after how much good they got out of them. Mr. Terrace went on to refer to the Education Scheme of the Institution of Gas Engineers. They in the Senior Association, he said, had always admired the work of the Juniors. He had expressed that view before; but the year that was past incurred much doubt in the Education Scheme, and he did sincerely hope that the Institution was not living in any fools' paradise. The difficulties with which they were confronted with the Education Scheme had led to a revision, and they hoped that they had now met all the difficulties put up at the time. The London Juniors, he was pleased to say, were the first to adopt the examinations as a condition of membership of the Association, and he did look upon them and the South of the country as being the first to see the faults in the Scheme as it was originally. Therefore, having revised the Scheme as they did last year, he hoped that they would take advantage of it. He was very pleased to tell them, from the information he had, that the effect of the new Scheme in regard to external students was to increase the number of internal students—not only in the main subjects, but also in the ancillary. They looked to the Juniors to do what they could to see that a large number came forward and took their examination as external students. It was 28 years ago, continued Mr. Terrace, that this Association was started, and he was sure they had a very good record. He wished them health and prosperity in the years to come. All the Presidents they had had during that time were still in the land of the living, and this was a very nice thought when he was about to propose the health of their President. He had known Mr. Larkin a long time. He was sure they must have had a very enjoyable session so far, and he had part of his year yet to come; he took this opportunity, therefore, of wishing him and the Association every success in the remainder of his session. He would drink the health of the Association, concluded Mr. Terrace, and they would drink the health of their President.

THE PRESIDENT'S REPLY.

The PRESIDENT, in replying to the toast, remarked that they in the London and Southern District Gas Association took their visits very seriously, and they certainly enjoyed them. They looked upon their Association as an educational one. He could assure Mr. Terrace, having been on the Committee of the Education Scheme himself, that the opportunities which were now afforded by the revision of the rules, were, in the opinion of the Junior Gas Associations, who were in a position to speak more deliberately on the subject, going to forward the interest in gas manufacture by study for the examinations. They in the Junior Associations could supply candidates. They had with them that night, continued the President, many notable visitors. They had their old friend Mr. Terrace; he was sure that a dinner of the London Juniors without Mr. Terrace present would be very regrettable. He had done much both for their Association and for the Education Scheme. He also referred to the presence of Mr. Chandler, Mr. Evans, Mr. Cross, Mr. Smith, Mr. Foot, and Mr. Grogono, saying how pleased he was to welcome them all there. In regard to the work of the Association, he wanted to impress upon all that they were out to do their best for the industry. Members of this Association not only gave up their time, but paid their expenses, to make these visits and gather information that they would otherwise have been unable to obtain. This showed that they were energetic and really desired to obtain information. The membership of their Association now, said the President, was 350 strong. The work of a president, he continued, was largely what his council and secretary made it. Could he in his year of office claim to have done less work than any other President? They had a strong Council who did their best to uphold the traditions of the Association. There was one upon whom the Association relied especially—and that was their Secretary. In Mr. Tennant they had one who had never been beaten.

THE TOAST OF THE VISITORS

Mr. S. B. CHANDLER, in proposing the toast of "The Visitors," said that for many years the Association had been extremely fortunate in its friends—friends who had assisted the Association to occupy the proud position which it did to-day in the gas industry. But he felt that he would be failing in his duty if he did not mention one or two names which came to him as striking examples of that spirit to which he had referred. The President had already referred in very expressive terms to Mr. Terrace, and with these terms he heartily agreed. He had done a great deal of work for the Association, and had helped them to hold the position they did to-day. Mr. Foot, he said, was an extremely busy man, and he too had been very sympathetic with the Junior Gas Association. Mr. Alexander, the new Secretary of the Institution, was there for the first time, and he hoped that it would not be the last. He also referred to Mr. Evans, Mr. Cleave Cross, and Mr. H. C. Smith, all of whom he was very pleased to see there on that occasion. Finally, he said how honoured they were by the presence of the ladies.

Mr. R. W. FOOT, replying to the toast of "The Visitors," thanked Mr. Chandler for the charming way in which he had proposed the toast. He (the speaker) was very interested in the aims and objects of their Association; and he was glad to be present because it gave him the opportunity of supporting his friend, Mr. Larkin, in the Presidential Chair, on behalf of the Company which he and Mr. Larkin and many others in the room that night served. No appreciation was necessary from the members; it was just the other way round. The visitors were delighted to be there; to show the interest they took in the Association; to tell them publicly that they who represented many of the London Companies there on that occasion would do all that lay in their power to help the Association forward. Turning to the subject of the Education Scheme, Mr. Foot said that he did not pretend to be an expert on it; he could not even pretend to have had anything whatever to do with it. But he was particularly interested in education in the gas industry. He was able to say what education was doing in the Gas Light and Coke Company. As Mr. Larkin had said, there were over 2000 men in this Company going to night classes, and he was quite sure that there was a similar state of affairs in all the other London Companies. The young men of to-day should equip themselves to take advantage of any opportunities that came their way. What did education do? First of all, it was the man himself who got the benefit. These were days of competition, and all must equip themselves for the battle of life. For this reason he was right in saying that the man who followed education benefited himself, and because he was benefiting himself he was also benefiting the gas industry of which they were all proud. "So I would like to thank you very much," concluded Mr. Foot, "for your hospitality here to-night, and wish you and your Association the very best of luck in all your doings."

During the evening an entertainment was rendered—both musical and otherwise—by Murray Ashford's Entertainers.

Illuminating Engineering Society's Dinner.

There were some interesting speeches at the largely attended annual dinner and dance of the Illuminating Engineering Society, which took place last Wednesday at the Princes' Galleries, Piccadilly, with the President, Dr. JOHN W. T. WALSH, M.A., D.Sc., M.I.E.E., in the Chair.

Col. Sir THOMAS F. PURVES, O.B.E., President of the Institution of Electrical Engineers, proposed the toast of the Society, making reference to the high level attained by the papers and discussions, which has placed the Society in the foreground of technical organizations. He remarked that the Society has built-up a real science of illumination.

In response, the PRESIDENT alluded to the advance made in illumination since the start of the Society some 21 years ago. He had some nice things to say about the pioneer work of the late Mr. Leon Gaster, and stated that the Memorial Fund to Mr. Gaster, which it was decided to inaugurate, has had a wonderful success, and that the sum of £250, which was considered to be necessary, has been practically reached. The Society has grown, until it now numbers nearly 400 members. It is hoped that local centres will in the near future be formed, for as long as the Society remains confined to London, it cannot do the maximum possible amount of useful work. For the growth and progress made, the President acknowledged the indebtedness of all to the indefatigable energy and unflagging zeal shown by the Hon. Secretary, Mr. J. S. Dow. Finally, the President mentioned that there will be still further work next year, when illuminating engineers from all parts of the world will be welcomed in this country, and when it will be necessary to see that Great Britain sets a good example in the way of running an Illuminating Engineering Conference and an International Commission on Illuminating.

The toast of "The Guests" was submitted by Mr. C. C. PATERSON, O.B.E., and responded to by Dr. F. E. SMITH, C.B., C.B.E., F.R.S., Secretary of the Department of Scientific and Industrial Research, and Mr. HAROLD E. COPP, M.Inst.C.E., Senior Vice-President of the Institution of Gas Engineers.

GAS FOR LIGHTING CAN STILL HOLD ITS OWN.

Mr. COPP, after explaining that he was representing the Institution of Gas Engineers in the unavoidable absence of Mr. C. S. Shapley, the President, said: Of all the Scientific Societies which have come into being during the past few years, there can, I am sure, be but few which have more fully justified their creation and existence than the Illuminating Engineering Society. I am no stranger to the science of illumination, having been deeply interested in it for nearly thirty years, and having spent many hours in the photometric testing of the first high-pressure gas lamps which were introduced into this country, and subsequently of the Nernst metallic filament, and gas-filled electric lamps. Artificial illumination is to a great extent a measure of the rate of development of our modern industries, and what we call civilization, as it enters largely into so many processes which are necessary to their prosperity. During the past few years, it has made amazing progress, and, speaking as a gas engineer, I can say that this progress has had a remarkably invigorating effect on the applications of gas lighting. Where decorative effect is the primary purpose, electric lighting starts with certain advantages; but I submit that the gas industry has not been slow to recognize these advantages, and that in cases where light is sold as a commodity for a certain price, gas is still able to hold its own, particularly in those centres where the price of gas is low.

PREJUDICE AND POLITICS.

I rejoice in the fact that this Society exists, as it has always avoided popular prejudice and has advocated all means of artificial illumination on their respective merits according to requirements. Only an amateur can afford to indulge in prejudice; a professional man cannot afford to do so without eventually damaging his reputation. The gas industry has served civilization faithfully for a century, and is still capable of doing so, but unfortunately it has come within the purview of politics—a very unhappy situation for any industry to find itself in. I venture to think it may not be very long before the electrical industry will desire to escape from some of the glare of the political "spot lighting" which it at present enjoys. [Laughter.] Each successive Government for the past decade has promised an electrical Elysium wherein everyone will have less work and increased wages, and enjoy all the amenities of life to the full. Well, all bubbles burst sooner or later—sooner if someone touches them.

Notwithstanding all this, I am a convinced believer in the future wellbeing of the gas industry, and hold the opinion that it will, side by side with the electrical industry, continue to progress. I base this opinion upon three facts: One is that in countries where electrical development has advanced more rapidly than it has in this country, gas is making remarkable progress. America is an example of this. The second is that any industry which can show such wonderful efficiency in the use of its raw material—coal—as the gas industry, must surely be in no danger of extinction. The third is that, though we have been passing through a period of financial disturbance which has depreciated the capital value of most of our industries, the storm has hardly produced a ripple upon the placid surface of the gas stock market.

There is another aspect of the question of illuminating wherein gas possesses a distinct advantage. I refer to the difficulties arising from glare and "intrinsic brilliance." Owing to the fact that the source of light from a gas mantle is of much greater area than that from an arc or metallic filament electric lamp, these difficulties are minimized.

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords.

Special Orders.

The following Special Orders have been laid before the House and referred to the Special Orders Committee: County Borough of Birkenhead, County Borough of Bury, City of Chichester Gas Company.

The following Special Orders, having passed the Special Orders Committee, have been approved by the House: Chorley, Bury, Spalding, and Kendal.

Private Bills.

The Brixham Gas and Electricity Bill, having been passed by the Examiners, has been read a second time and is waiting for commitment.

The following petitions have been presented against Private Bills: Gas Light and Coke Company against the London United Tramways Bill; Portsmouth Gas Company against the Portsmouth Corporation Bill.

House of Commons.

Special Orders.

The following Special Orders have been approved by the House: Borough of Chorley, Spalding Urban District Council, Barry Urban District Council, Borough of Kendal.

The following Special Orders have been presented to the House and ordered to lie upon the Table: County Borough of Bury, City of Chichester Gas Company.

Plans have been deposited in connection with the Rochester, Chatham, and Gillingham Special Order.

Private Bills.

The South Staffordshire Mond Gas Bill has been passed by the Examiners and referred to the Unopposed Bills Committee.

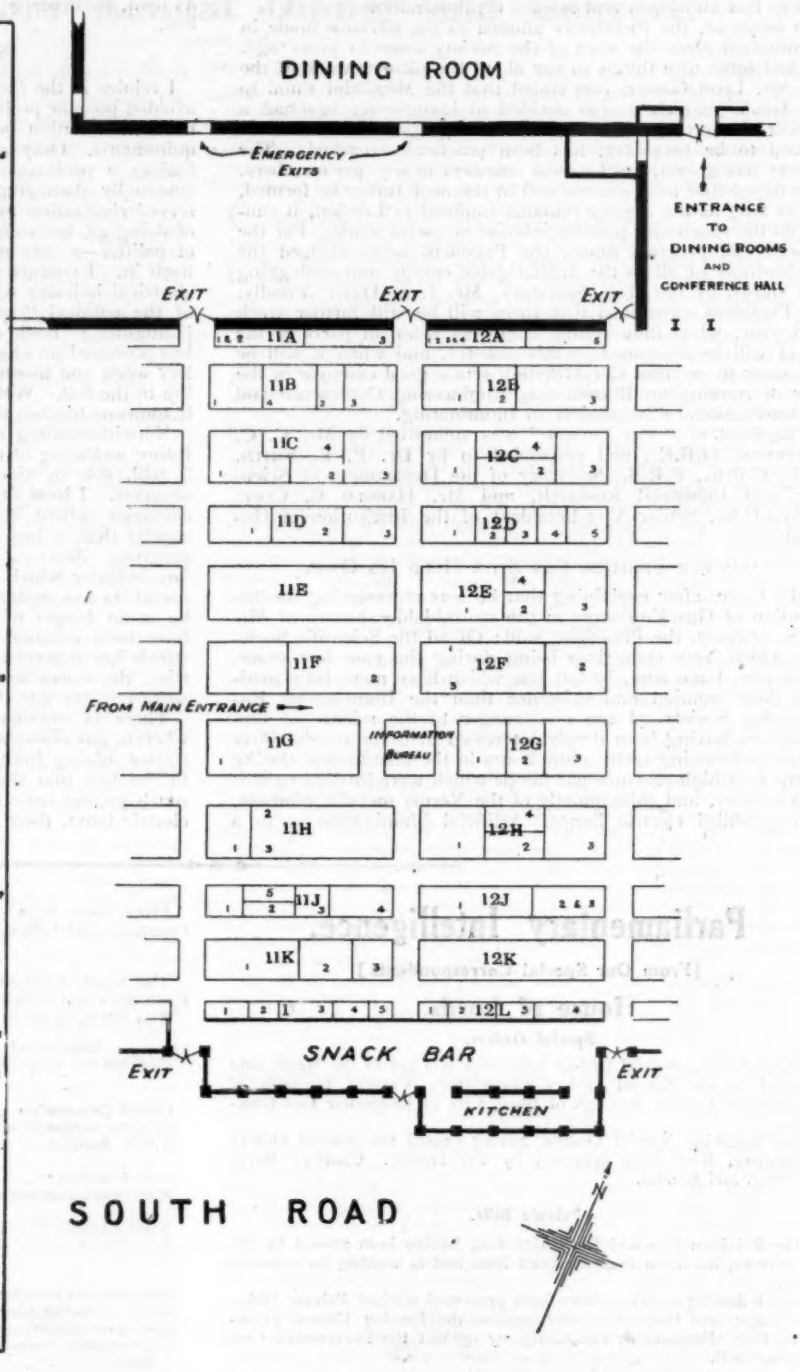
The following petitions have been presented against Private Bills:

Name of Bill.	Name of Petitioner.
Brighton and Hove Gas	Brighton Corporation, Portslade Urban District Council, and East Sussex County Council.
Cardiff Corporation	Cardiff Gas Light and Coke Company.
Croydon Corporation	Croydon Gas Company.
L.N.E. Railway	Brentwood Gas Company and Romford Gas Company.
L.M.S. Railway	Gas Light and Coke Company.
Manchester Extension	Stretford and District Gas Board and Altrincham Gas Company.
North Cheshire Sewerage Board	Stretford and District Gas Board.
S. Yorkshire and Derbyshire Gas	Maltby Urban District Council and West Riding County Council; Sheffield Gas Company.
Liverpool Corporation	Liverpool Gas Company.
L.C.C. (Charing Cross Bridge)	South Metropolitan Gas Company.
Bournemouth Corporation	Bournemouth Gas and Water Company.
Bournemouth-Swanage Motor Road	Bournemouth Gas and Water Company.
Brighton and Hove Gas	Hove Corporation, Steyning West Rural District Council, Shoreham Urban District Council, and Southwick Urban District Council.
Chester Water	Chester United Gas Company.
Dartford and Purfleet (Thames Tunnel)	British Carbocite Smokeless Fuel, Ltd.
L.N.E. Railway	National Association of Coke and Bye-Product Plant Owners.
L.M.S. Railway	Ditto.
Newport Corporation	Newport (Mon.) Gas Company.
Southern Railway	National Association of Coke and Bye-Product Plant Owners, and Kingston-upon-Thames Gas Company.

BRITISH INDUSTRIES FAIR 1930

— GAS SECTION —

ASBESTOS CEMENT & BUILDING PRODUCTS LTD	11A 3
BRITISH ROAD TAR ASSOCIATION	12B 1
BRAY, GEO. & CO LTD	11H 3
BRYAN DONKIN CO LTD	11L 5
BROMFORD TUBE CO LTD	12K
BRITISH FURNACES LTD	11K 2
BRITISH COMMERCIAL GAS ASSOCIATION	12C 1&4
CANNON IRON FOUNDRIES LTD	11F 1
CHEMICAL ENGINEERING & WILTONS PATENT FURNACE CO LTD	11B 3
CELLACTITE & BRITISH URALITE, LTD.	12C 2
COLEMAN FOUNDRY EQUIPMENT CO	11B 2
C.C. FIRES COMPANY	12L 2
CUTLER SAMUEL & SONS LTD.	12D 2
DEAN W.H. & SON LTD.	11D 2
E.B. REFRACTORY CEMENT CO LTD.	11L 1
EVESONS (COAL) LIMITED	11C 1
FLAVEL, S. & CO LTD.	12E 1
FALK, STODELMANN & CO LTD.	12E 3
FOSTER & PULLEN	11D 3
FOSTER INSTRUMENT CO LTD	11J 2
GAS JOURNAL	12L 1
GENERAL GAS APPLIANCES LTD.	11H 2
GENERAL REFRACTORIES LTD.	11B 1
GIBBONS BROS LTD.	11J 1
GLOVER GEORGE & CO LTD.	12L 3
GLOVER THOMAS & CO LTD.	11E
HARPER JOHN & CO LTD.	11C 5
HOLMES, W.C. & CO. LTD.	12C 3
HORSTMANN GEAR CO LTD.	12G 2
HURRY WATER HEATER CO LTD.	11K 3
HYGIENIC STOVE CO LTD.	11C 4
INCANDESCENT HEAT CO LTD.	11K 1
INDUSTRIAL RESEARCH LABORATORIES	12B 3&4 12H 3
JOINT TESTING EXHIBIT	12G 1
JOYMANCO (BRIGHTON) LTD.	12B 2
LIGHTING TRADES LTD.	12C 3
MAIN R & A LTD.	11E
MACPHERSON DONALD & CO LTD	12E 2
MELTHAM SILICA FIREBRICK CO LTD.	11F 2
METROPOLITAN FUEL CO LTD.	11J 4
NATIONAL GAS ENGINE CO LTD.	12J 1
NEW GEYSERS LTD.	12D 1
PARKINSON & COMPANY	12F 3
PARKINSON & COWAN	12J 2&3
PARKINSON STOVE CO LTD	12F 1
RADIATION LIMITED	11G
RAINSFORD & LYNES LTD.	12D 3
RUUD MANUFACTURING CO LTD.	11C 2
SIGMA INSTRUMENT CO LTD.	11L 4
STOURBRIDGE REFRACTORIES CO LTD	12D 5
SUTHERLAND METER CO LTD.	12H 1&3
SUTHERLAND A.G & CO LTD.	12M 2
SUGG WILLIAM & CO LTD.	11B 1&2 12B 1&2
TAUNTON J & J LTD.	12E 4
TILLEY BROS LTD.	12D 4
TIMMIS & CO LTD.	11J 3
TURNER F (ART METAL) LTD	11J 5
WALKER C & W LTD	11L 3
WALLER GEO & SON LTD.	11L 6
WATERLESS GASHOLDER CO. LTD.	12B 5
WELSBACH LIGHT CO. LTD	12G 3
WESTS GAS IMPROVEMENT CO LTD.	11D 1
WILLEY & CO LTD.	12H 1&2
WILSON GEO (GAS METERS) LTD.	12F 2
WHITEHOUSE WILLIAM & CO LTD	12L 4
WOODALL DUCKHAM COMPANIES	11H 1



PLAN OF THE STANDS,

WITH NAMES AND POSITIONS OF EXHIBITORS.

Gas Industries Section at the British Industries Fair, Birmingham.

Feb. 17 to Feb. 28.

[Exhibits Described in Alphabetical Order.]

Once more we have in the Heavy Section of the British Industries Fair at Castle Bromwich, Birmingham, a Gas Industries Section which is an excellent example of an organized Trade Group. In it there are over eighty exhibitors, who have arranged a striking, co-ordinated display which will do much to further the interests of our great industry. A general colour scheme marks the bounds of the Gas Section, and further help in this direction is rendered by a strikingly modern form of roof decoration, which harmonizes excellently with the stands below it. All who visit Castle Bromwich on this occasion—and year by year their numbers grow amazingly—will be impressed by the Gas Section, and by the good work of those who have had any part in its preparation.

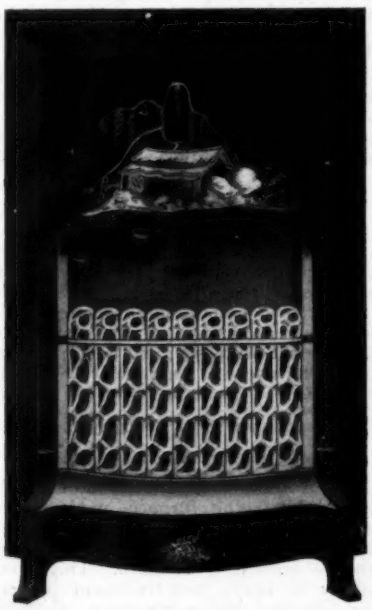
Two of the Joint Gas Conference papers—those by Mr. W. B. McLusky and Mr. F. J. Gould—are published in this issue. The discussions and luncheon speeches, together with Mr. A. H. Barker's paper, will be reported later.

Arden Hill & Co.,

Aston, Birmingham.

(Radiation Ltd., Proprietors.)

This firm show their latest porcelain-enamelled "Acme" gas cooking range, with "Regulo" oven-heat control and incorporating the well-known "New World" oven, with its single burner and direct bottom-flue outlet. This oven is also a feature of their No. 33 "New World" cooker, on the stand. The firm's beautifully designed gas fire—the "Marchioness" (in Chinese Lacquer Black finish)—makes a very fine show. It has the patent "Injector-Ventilator" device in the canopy, and is fitted with the new "Beam" radiants. The "Hotflow" boiler is well known to the industry, but continues to increase its popularity. A 6-gallon size is shown on the stand, in "Rado" porcelain enamel finish. A "St. Bernard" radiator completes a very interesting exhibit from the Acme Works.



"Swastika" Fire.

"Hotflow" Boiler.

"St. Martin" Radiator.

Asbestos Cement Building Products, Ltd.,

Trafford Park, Manchester.

The exhibit comprises, generally, asbestos cement goods, but more particularly "Everite" gas flue pipes and fittings. The latter have now been in use in Great Britain for eight or nine years. "Everite" flue goods and fittings are manufactured by the "Hatcheck" process, by which they are built up layer by layer under pressure. The outstanding advantages in using asbestos cement pipes instead of metal are that they are non-corrodible, and the walls are non-conductive of heat to a high degree. The first point needs no elaboration; the second explains the absence of condensation when they are used. Owing to the non-conductivity, the inside temperature rises rapidly, and slightest condensation quickly evaporates and is carried out with normal flow. "Everite" flue pipes are also used by slow combustion stove manufacturers, and, as far as domestic appliances of this type and also for gas are concerned, the firm's pipes are eminently suitable for practically every purpose. In addition, specially prepared pipes are provided for fume cupboards and removal of various acid fumes.

City of Birmingham Gas Department.

One of two exhibits by the City of Birmingham Gas Department is devoted to the activities of the Industrial Heating Section, the main object being to develop the use of gas for industrial heating purposes, particularly in Birmingham, and also with a view to assisting the gas industry as a whole by exhibiting modern types of gas furnace plant which may be seen by manufacturers from all over the country, and by representatives of gas undertakings. This stand forms, as usual, an Advisory Bureau, at which any visitor to the Gas Industries Section who may be interested in the application

of town gas to industrial processes can obtain information. The general arrangement of the stand again conforms to the requirements of the special designs and colour schemes of the Gas Industries Section.

In view of the large amount of experimental work which has been carried out by the Gas Department during 1929, the stand for 1930 is being used to exhibit two furnaces only under practical working conditions. The two furnaces selected are of the natural draught recuperator type, one being made by Messrs. Gibbons Bros., Ltd., of Dudley, and the other one by the Incandescent Heat Company, Ltd., of Smethwick. Each furnace is being equipped with a separate gas meter and automatic gas control apparatus. The Gibbons furnace is fitted with auto-control and temperature recording apparatus made by the Electroflo Meters Company, Ltd., and the incandescent heat furnace is fitted with auto-control apparatus and temperature measuring instruments made by the Cambridge Instrument Company.

Either of these furnaces is recommended for such metallurgical operations as carburizing, re-heating of carburized work, annealing, normalizing, hardening, and, in certain instances, enamelling, and it is the intention of the Birmingham Gas Department to have each of the furnaces operating under working conditions during the Fair, on the heat-treatment of automobile engine and gear parts, stampings, &c.

The furnaces and apparatus shown by the Department on the second stand are intended to be representative of a wider range of industrial gas applications than will be the case on the larger stand. Unfortunately, it has not been possible to have the furnaces on the smaller stand operating under practical working conditions. The processes represented by the apparatus include carburizing, re-heating of carburized work, annealing, normalizing, hardening operations without scaling (in a gas-sealed atmosphere), steam raising, jewellers' enamelling operations, bulk water heating in insulated tanks, melting, high-speed steel treatment, and steel heat-treatment by the salt method.

The exhibits on these stands are representative of the productions of the following furnace manufacturers, and a brief description follows:

Gibbons Bros., Ltd.,

Dudley.

This firm have submitted one of their new pattern gas-heated, natural draught, recuperator oven furnaces, in which special attention has been paid to the refractory materials and the important question of insulation in the main body of the furnace; and it may be mentioned that the recuperators employed are partly brick and partly metal. The whole is placed in a cast-iron casing, the door which is fitted having been specially designed to reduce heat losses to a minimum. Particular attention has been paid to the lifting gear, and sealing, when the door is in position. The gas supplies to this furnace are automatically controlled by apparatus which is described later. The Gibbons furnace is shown under practical working conditions.

Incandescent Heat Company, Ltd.,

Smethwick.

This firm have been experimenting for some months with a natural draught, gas-heated oven furnace, in which close attention has been paid to fine details of design. The questions of refractories, insulation, door, and particularly the fine control of air admitted to the furnace, both as primary and secondary, have received careful consideration. The results of these experiments are embodied in the furnace exhibited by the Birmingham Gas Department on this stand, the furnace being shown under practical working conditions, and fitted with automatic control, as mentioned later.

Electroflo Meters Company, Ltd.,

London.

The Gibbons natural draught oven furnace referred to earlier is fitted with automatic gas control apparatus made by Messrs. Electroflo Meters Company, Ltd. The results of experiments with this type of apparatus on working installations of gas-heated furnaces show good results, and examples of the charts showing the accurate control of temperature obtainable with this instrument will be available for inspection, as the furnace is also fitted with suitable temperature recording apparatus.

Cambridge Instrument Company,

Londoñ.

The gas supply to the natural draught, gas-heated furnace made by Messrs. The Incandescent Heat Co., Ltd., is automatically controlled by apparatus designed by Messrs. The Cambridge Instrument Company. This instrument comprises a temperature regulator fitted with patent regulating device controlling a balanced gas valve. A separate thread recorder in this case also will provide charts showing the control obtainable with this particular instrument.

The furnaces on the second stand are not shown under working conditions.

Manchester Furnaces, Ltd.

A large high-speed steel furnace is also shown, arranged with the usual pre-heating and high-temperature chambers. A special feature of this furnace is a tubular pre-heater built into the under part of the furnace brickwork, for pre-heating the air supply.

Lumby's, Ltd.,

Halifax.

A small gas-heated boiler for steam generation is to be seen on this stand. The use of town gas for steam generation is being considerably extended, and this boiler is representative of several excellent types now available.

John F. Askam,

Birmingham.

(A) A salt bath furnace by this maker is shown, representing the general types of furnaces which are available for the new and satisfactory method of salt bath treatment in the hardening and tempering of tools. The furnace is designed with brickwork lining with M.S. plate casing, with hood, and lifting gear for the baskets containing the work to be treated.

(B) A muffle furnace representing the range of standard sizes made by Mr. Askam. In the design of this particular muffle, special attention has been paid to the close fitting of the burners; and insulating material has been placed between the refractory lining of the furnace and the outer wall.

Brayshaw Furnaces and Tools, Ltd.,

Manchester.

(A) A standard type of low-pressure gas-heated muffle furnace made by this firm is shown—one of the well-known N.M. series—and suitable for jewellers' enamelling, and for certain special tool heat-treatment operations.

(B) A low-pressure gas-heated metal melting furnace, suitable for metals having a comparatively low melting point, as, for example, lead, tin, zinc, &c. The furnace is shown fitted with a cast-iron pot placed in a suitable brickwork lining and plate casing. The furnace is also fitted with a suitable hood.

British Furnaces, Ltd.,

Chesterfield.

The above firm are represented on this stand by one of their standard "A" type oven furnaces, arranged for use with gas and air under pressure, the supplies of each to the burner being controlled by their own proportioning device. This furnace is used for the speedy attainment of the temperatures used in general heat-treatment processes; and burner equipment can be supplied for the attainment of comparatively high temperatures for brick testing, &c.

Incandescent Heat Company, Ltd.,

Smethwick.

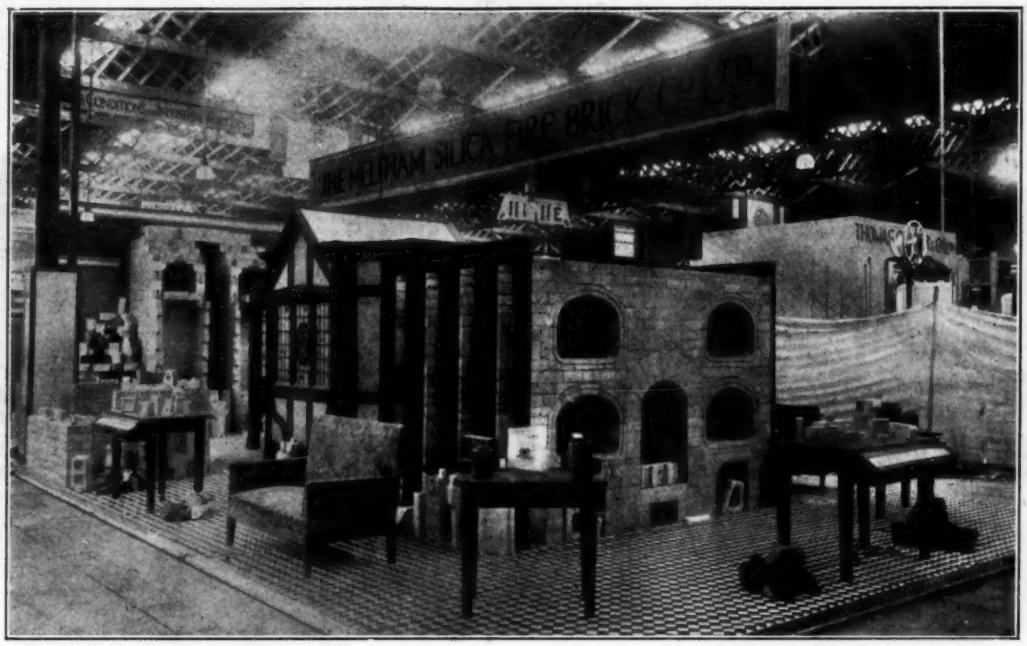
A special feature is made on this stand of the Walter-Palser patent gas-sealed hardening furnace, made under licence by Messrs. The Incandescent Heat Company, Ltd. The furnace shown is complete with muffle chamber, extension piece, and dip pipe into the quenching medium. This furnace is used very successfully in many heat-treatment operations, where freedom from oxidation and a minimum of distortion are required. The furnace has been particularly successful in the hardening of needles and razor-blades; also for valuable moulding dies and similar articles.

George Bray & Co., Ltd.,

Leeds.

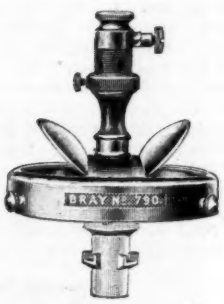
This firm show their range of burners for incandescent and ordinary flat-flame coal gas. Most of the patterns are now familiar to all gas engineers and managers, especially the No. 790 series, which increases in popularity each season. The same can also be said of the Bray patented diffuser—a device to prevent lighting back and noisy burning. A more recent innovation is the chromium-plated finish for burners, and many of the fittings at this stand are in this finish. A very wide range of patterns is on view—inverted types, including one with a reversible arm for adapting either to upright or to inverted fitting; swan neck types; upright burners, for which there is still a considerable demand; burners for bowl lighting, hall lamps, landings, &c. All Bray burners are made of the very best materials, designed to maintain the highest efficiency, and tested under actual working conditions before leaving the factory.

Street lighting engineers will probably be interested in examining the selection of well made incandescent burners for



street lighting which are on view. In addition there is a selection of the well known Bray flat-flame burners which,

No. 717/2.
Street Lighting Burner—
Heavy Pre-Heating Type.



No. 790.
Universal.
Fitted with Open-ended Nozzle.

BRAY BURNERS.

though very little used for lighting purposes nowadays, should be worth the attention of manufacturers of gas heating apparatus.

British Commercial Gas Association,

28, Grosvenor Gardens, S.W. 1.

The displays by the British Commercial Gas Association are designed to interest all types of visitors to the British Industries Fair.

One stand is devoted to educational propaganda and to the stimulation of public interest in clean air. The stand demonstrates, by means of an artistic backscreen, how any industrial town might appear free from smoke, by the general adoption of gaseous fuel in place of raw coal. In addition to this, samples of some of the wonderful bye-products obtained from the scientific carbonization of coal are effectively displayed.

This display demonstrates in a very striking and attractive manner the great part which the gas industry plays in relation to public health and hygiene, as well as in the conservation of the source of the nation's wealth—coal. Some of the great branches of public utility made possible by the scientific treatment of coal in the gas-works are indicated and illustrated in a pictorial as well as in a practical manner.

Visitors to the Fair find this stand particularly interesting, because, in addition to the story it tells us so effectively, it is a fine example of educational propaganda brought about as the result of co-operative publicity.

The second stand of the Association, though designed particularly to interest those connected with the gas industry, holds considerable interest to members of other industries in demonstrating the wide scope of the Association's activities in co-operative publicity. The central feature of this stand is the bookstall. This feature is intended to show in a practical form the number, variety, and extent of the media of the Association's direct advertising campaigns. It is a sure reminder to the Association's members and others, that on every bookstall throughout the country there are numerous publications in which the story of gas as a great public utility service is appearing. The remainder of the stand is devoted to samples of the Association's service to its members in the supply of advertising literature, and various other details of co-operative activity.

This stand is also intended as an appreciated meeting place for members of the gas industry.

British Furnaces, Ltd.,

Derby Road, Chesterfield.

A gas-fired rivet heater of the portable type is shown in operation, and this heater is of the form as used in shipyards, constructional works, railway workshops, &c. The main features are rapid heating, uniform temperature, control of atmosphere in the furnace, single valve control, and automatic proportioning of the gas and air, all of which are obtained by the use of the well-known surface combustion equipment supplied by British Furnaces, Ltd.

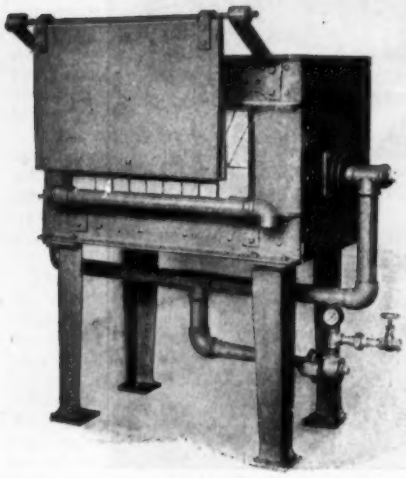
Another exhibit of interest to firms melting tin, lead, type metal, and other soft metals is a small gas-fired melting furnace fitted with natural draught burner and having a pot capacity of 300 lbs. of lead. A considerable number of these furnaces have been supplied for a variety of trades, and show remarkably high efficiencies for this class of furnace. A high-speed steel furnace for tool-hardening at temperatures up to 1350° C. in the lower chamber and 875° C. in the upper one is in operation. A gas-fired crucible furnace for brass and copper melting, and suitable for accommodating a 40-lb. (copper) crucible is also in operation on this stand. A further exhibit of interest to the nut and bolt trade and also to rivet makers is a rod end heater, fitted with surface combustion automatic proportioning and single valve control equipment. Various gas and oil burners, venturi mixers, and other gas-burning appliances are shown, together with a number of photographs

and coloured drawings of large furnaces for normalizing, annealing, and carbonizing.

The Company are makers and builders of furnaces for practically every industry where heat is required in the manufacturing processes. Modern industrial requirements are so varied that it is not possible to enumerate them all, but we give below a list of the more important industries for which they are prepared to supply suitable furnaces, drying ovens, &c.

Furnaces for the shaping and forming of iron and steel for the heat treatment of special steels, melting of all classes of non-ferrous metals; furnaces and baths for surface treatment of metals; foundry core drying ovens; furnaces for the glass and ceramic industries; distillation furnaces for oil and tar; furnaces for varnish boiling, kilns, sugar boiling, glue heating, boiler firing, and baking ovens; refractory testing furnaces. The Company also supply assay plants for the evaluation of coal for carbonizing purposes, for which they supply a complete plant, including washers, purifiers, and holder.

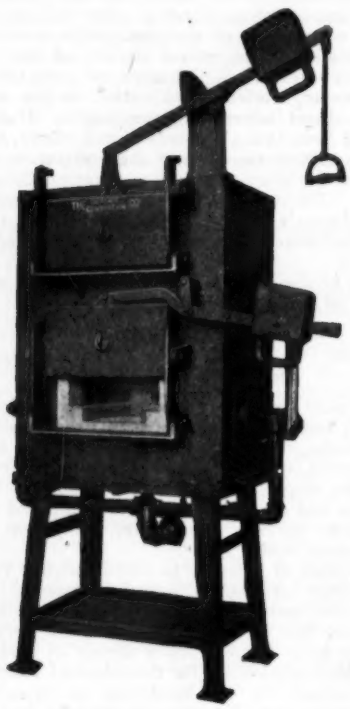
The Company have recently installed two patent continuous-belt conveyor furnaces for heat treating driving chain links, which are the first of this type to be put down in this country. They are also now developing a gas-fired regenerative furnace.



Surface Combustion Gas-fired Rod End Forge Furnace.

Surface Combustion Gas-fired Portable Rivet Heater.

Gas-fired Soft Metal Melting Furnace.



Surface Combustion Gas-fired Double Oven Furnace for High-speed Steel.

British Road Tar Association,

17, Grosvenor Gardens, S.W. 1.

It is only natural, with the present-day widespread movement for increasing the adoption of British goods, that some such effort should be made to support British tar, a material which made possible the earliest step taken towards the construction of roads on the lines upon which they are to-day formed. Road tar is adaptable to any form of road work from the simplest re-surfacing, tar spraying, to the entire re-construction of the highway.

In order that the advantages of road tar should be made more widely known, the British Road Tar Association are exhibiting at the Fair. The theme of the display made is to present a comprehensive survey of the use of tar for road-making, and includes samples of road tar complying with the British Standards Specifications, which have been recently issued; British aggregates in the tarred and untarred state used for road construction; sections taken from tarmacadam roads, and sections taken from experimental roads constructed with tar; and scientific instruments used in the testing of tar. A conspicuous feature is the Association's tar viscosity demonstration apparatus, which provides a continuous demonstration, and indicates, at a glance, those desirable properties necessary in road tar for road-making purposes. There is also a selection of photographs illustrating the value of all-British materials for road construction and some interesting literature on the tar treatment of roads.

Bromford Tube Company, Ltd.,

Rocky Lane, Aston, Birmingham.

The new seamless steel lighting standards displayed on the Bromford Tube Company stand are of special interest to all lighting engineers. The new types with fluted columns, both spiral and vertical, are very distinctive and pleasing in appearance and have the following special advantages:

1. Made from special quality seamless steel.
2. High tensile strength.
3. Free from structural weaknesses such as blow holes, cracks, &c.
4. Lighter in weight than cast-iron, and therefore easier to handle and cheaper to transport.
5. Are not brittle.
6. If bent, can be re-straightened and put into use again.

Special plant has been installed for the manufacture of Bromford lighting standards, which enables them to be offered at competitive prices with all the advantages of being made in seamless steel. Types are made for all gas and electric lighting requirements.

The Bromford seamless steel gas main is also being exhibited. Bromford seamless steel tubes and fittings provide a thorough complete and efficient system for gas distribution.

Complete installations, including bends, tees, syphons, and all fittings, can be supplied with standard spigot and faucet or special joints.

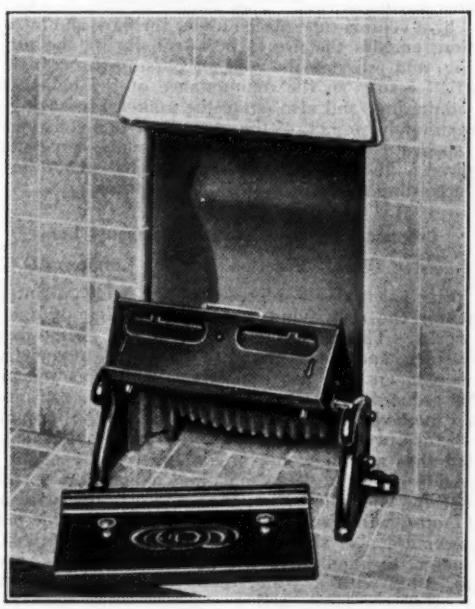
C. C. Fires Limited,

9 and 10, Mark Lane, London, E.C. 3.

This exhibit comprises various models of the "C.C." combination gas and open fires adaptable to all fireplaces. The gas fire in each instance is unusually low, but proportionately wide with inclined radiants, permitting an open fire to be used in the well grate behind. The gas fire is thus always available for early morning work and whenever required. This combination makes a great appeal to those who appreciate the convenience of gas heating, but will not give up altogether their open fire. For clearing the ashes from under the grate, the gas fire is hinged and is held suspended by a shoot bolt, or alternatively the hinge pins may be withdrawn, and the gas box containing the burner and radiants removed. Either operation is a matter of seconds only and no gas connections are disturbed, the gas fire being connected by a rigid pipe.

An ingenious form of adjustable stool grate for the open fire is supplied, making it possible to fit any shape of fireplace within half-an-inch all round from a few standard parts, or, alternatively, the existing grate bottom may be retained by the

"C.C." Combination Gas and Open Fire.



Showing Detachable Cover and Gas Heater Unit hinged up for cleaning under Grate.

use of a bridge plate between the gas fire and the grate bottom. Included among the models is a combination gas and coke fire with many interesting features. The coke is gas ignited and the fireback is shaped permitting the fire to sit right back in any modern low fireplace, without alteration to the latter. Extra draught may also be obtained by a short length of flue pipe in the chimney. The firebricks are all of the same size and easily renewable, and the whole combination is fitted in exactly the same manner as the orthodox gas fire.

Cannon Iron Foundries, Ltd.,

Deepfields, Nr. Bilston, Staffs.

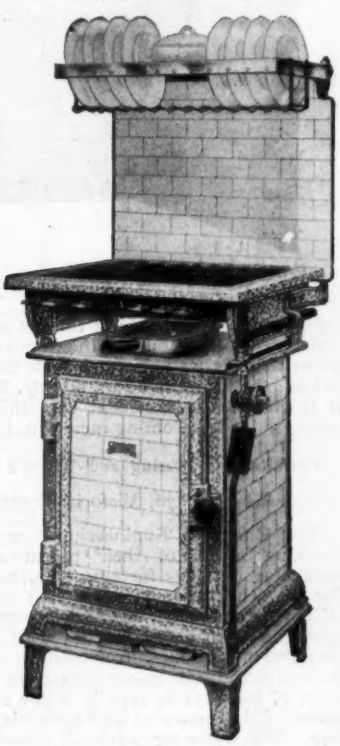
The latest additions to this firm's series of "Porceliron" mottled enamel finished cookers include the "Challenge," "Centenary," "Oxford," and "Cottage," the mottle being quite distinctive, and affording a highly glazed surface. The "Autimo" oven heat controller enables the cooking to be done without attention while the housewife is engaged upon shopping or domestic duties.

A series of inclined gas fires which are of unique construction, on the principle of distributing the heat to the body as well as to the feet, are also displayed. Experiments prove that with the new inclined fires the whole of the heat is usefully radiated into the room. The fires are supplied in art metal sheathed brass, copper and pewter, also in art copper and art silvo finishes, as well as best satin black.

"Carnation" Gas Fire.

Another exhibit, the "Belle" radiator, is designed to give the greatest measure of heating service per square inch of tube surface, at the same time allowing the products of combustion on leaving the radiator to be warm (not hot), and chemically pure. The "Argand" burner, regulated by a pressure governor, gives complete combustion. By means of the heat resisting chimney, a great amount of air is drawn past the flame; this heated air has to pass up the enamelled front tube, and down the rear tube before being discharged. As all the useful heat is abstracted by the tubes, and converted into health-

"Belle" Radiator.



"New Challenge" Cooker.

giving, radiant heat, every square inch of the tube surface, therefore, serves to warm the room, and at the same time the atmosphere remains pure. The glow from the translucent

chimney is enhanced by the copper reflector and adds to the cheery warmth of the radiator.

The " Equator " gas steam radiator, also shown, is well known for its efficiency and good service.

The " Corna " and " Modern " wash-boilers are all-cast and fitted with rustless glaze inner pan. Rustless glaze is a " Cannon " speciality, and being permanently rustless, is far superior to the usual bower barffing process. With rustless glaze there is no danger of iron mould. The angular top of the " Corna " pattern fits into any corner of the scullery. The outer pans are supplied with " Porceliron " mottle enamelled exteriors. The K900 gas iron in " Porceliron " mottle enamelled finish maintains its clean and smart appearance after prolonged use, the enamel being unaffected by the heat.

Cellactite & British Uralite, Ltd.,

296-302, High Holborn, W.C. 1.

The well-known incorrodible gas flue piping " Urastone " is again exhibited, including several new and interesting items. Of particular interest is the new " Urastone " cupboard heater. This heater provides a convenience long sought by gas consumers. It supplies an inexpensive means of heating the linen

"Urastone" Cupboard Heater.)

cupboard, independently of the hot water supply system, which service is a boon during the summer months or at any time when there is no hot water tank available. Gas consumption is low; the fitting is clean, sightly, light, and incorrodible; and it is cheap. It is evident that this heater is an aid to gas sales, and it is becoming increasingly popular in the industry.

Chemical Engineering and Wilton's Patent Furnace Co., Ltd.,

76, Victoria Street, S.W. 1.

The Chemical Engineering Company's exhibits include a working model of their patent static washer-scrubber for scrubbing coal gas for ammonia, benzole, and naphthalene, or for the dehydration of gas. This washer consists of a number of bays constructed in cast-iron separated from each other by partition walls; each of the washers is fitted by an uptake chamber to prevent entrainment of the liquid from any one bay to the next. The gas passes from the inlet chamber through each of the bays in turn in a downward direction through the patent filling material and upwards through the uptake chamber. The water (or wash-oil) enters at the opposite end of the washer and overflows from each bay to the next. The liquid is circulated from the pump at the bottom of each bay and is showered over the filling material in each bay, and it will be noted that the liquid in each bay is continually being circulated and passes down in the same direction as the gas, thus reducing the back pressure to a minimum. The principal advantages claimed for this type of washer-scrubber can be summarized as follows:

(1) There are no internal moving parts, thus eliminating the principal cause of breakdowns and ensuring reliability.
(2) The special patent packing ensures a most intimate washing contact, thus producing efficiency.
(3) The washer-scrubber owing to its " static " nature and design is compact, easy to inspect, and takes up very little ground space.
(4) In ammonia recovery no fresh water is needed, as scrubbing can be completed by prepared virgin liquor.

The 25-ton-per-day Wilton's patent draining, drying, and chemical treatment machine for use with their sulphate plants consists of a mechanically operated sulphate receiver with acid resisting scraper conveyor, the speed of which can be regulated to deliver the exact quantity of sulphate from the draining table to the moving conveyor-belt, which is made of a special metal which is both alkali and acid resisting, and is constructed in such a manner to be very pliable and arranged to travel over drums situate at each end of the conveyor. The belt is kept in tension by automatic tensioning gear, complete with adjustable plumber blocks. After discharge of the salt the belt passes through a water trough.

A number of vacuum shoes are placed under the belt, the first of which draws out any surplus mother liquor and surface acid; between the first and second shoes neutralizing is effected by adding weak ammonia liquor or other known means. The remaining shoes effectively remove the surplus moisture from the neutral salt to such a point that the moisture content is reduced to a minimum. From the belt the salt is delivered in a continuous stream to a final drier which also forms part of their exhibit. The salt is converted into dry neutral sulphate, crystalline in form, by rotating shovels fitted on the outside of a rotating nest of tubes, which gradually convey the sulphate from the wet end to the dry end of the machine, where it leaves the machine through a perforated plate, and can be delivered direct into bags or to a conveyor or other means of storage.

The advantages claimed for this machine can be summarized as follows:

(1) Dry neutral salt of the highest grade and standard quantity containing not more than about 0·1 p.ct. moisture is obtained, or more than 0·025 p.ct. free acid.
(2) The salt is mechanically handled throughout the whole process, thus greatly reducing the labour charges.
(3) No high-speed machinery is used, thus reducing wear and tear and the element of breakdown.

A fourway furnace is shown on their stand, in accordance with the general principles and development of the firm's furnaces during the last 30 years. Their latest addition—viz., a patent sloping bridge, is an advance in the progress towards the further saving of fuel. This sloping bridge, to which air is supplied by a venturi tube placed under the bars and by a special connection, enables the fire to be burnt during the process of clinkering, and prevents the cold air passing through the flues. This action results in the maintenance of the boiler pressure during clinkering, and also (state the makers) in saving of fuel of approximately 10 p.ct. of the amount of fuel consumed.

This apparatus also can be used as a smoke consumer when so required. The air blast is inducted by steam jet or air blower according to the size of the installation.

Coleman Foundry Equipment Company, Ltd.,

1, Lancaster Place, Waterloo Bridge, London, W.C. 2.

The principal exhibit represents an oxide disintegrating machine for the revivifying and disintegrating of oxide used in gas-works. This machine was first placed on the market in January, 1929, and it was found that whereas to revivify oxide by hand cost 17s. 6d. per ton, when using this machine the cost was reduced to the very low figure of 1s. per ton. The original method for revivifying oxide was to employ hand labour to turn over the oxide with ordinary shovels, and it was estimated that a man would break and revivify about ¾ of a ton of oxide per day. This machine, which is a portable apparatus, being movable by one man and operated with a 5-H.P. electric motor, will break and revivify 5 tons of oxide per hour.

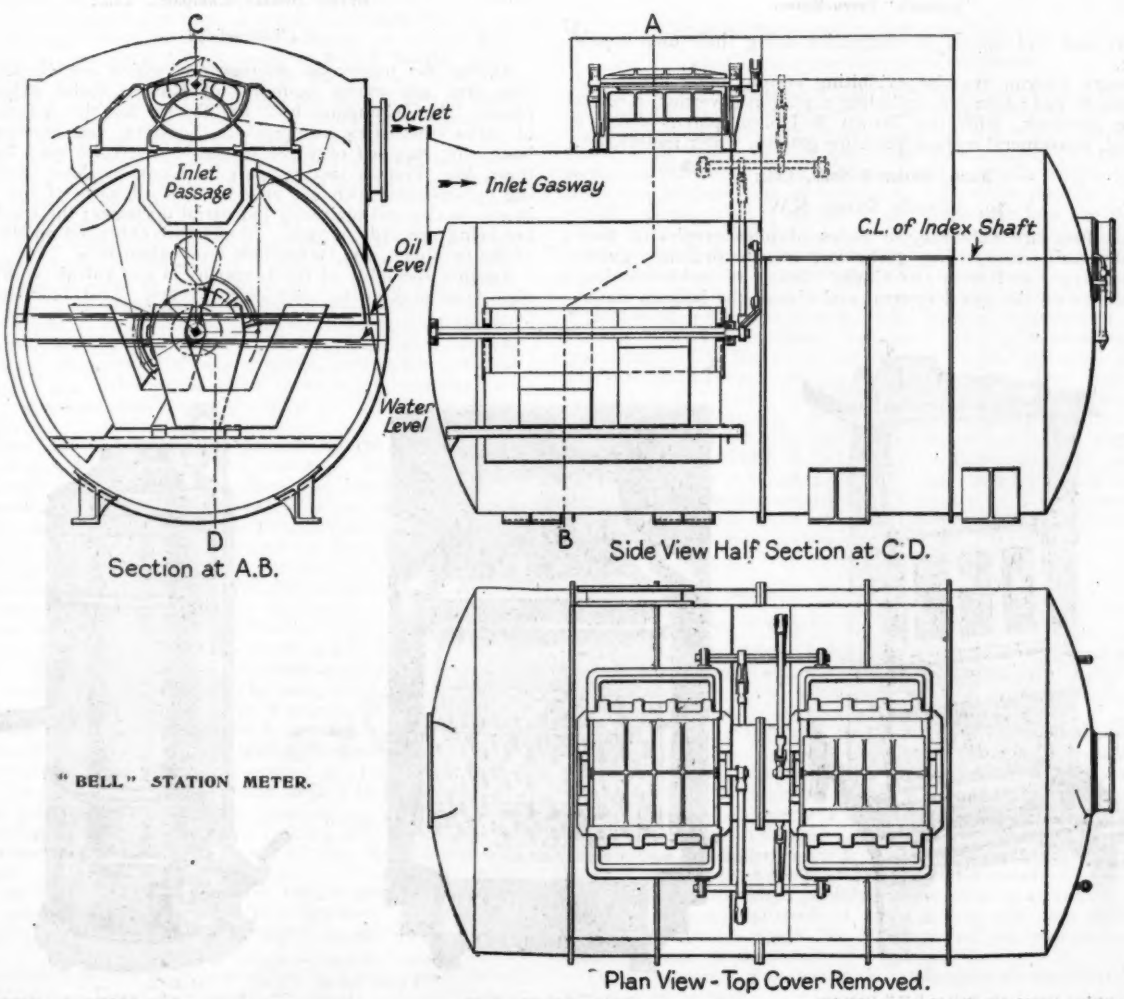
The firm are also showing a No. 1 machine, fitted with a 5-H.P. motor, to handle five tons of oxide per hour, a smaller machine, fitted with a 3-H.P. motor, to handle two to three tons of oxide per hour, and a machine fitted with a water-cooled petrol engine which they are installing in gas-works having no electric current available.

Attached to the No. 1 type of machine, is exhibited a patent self-winding cable reel winding electric cable. This reel is considered a very useful article for trailing cable, because it is not necessary when one of these reels is in use to have the cable trailing on the ground, which deteriorates the cable very considerably. Other specimens on the stand represent foundry equipment—*i.e.*, " Coleman " power squeezer split pattern moulding machine, " Coleman " plain jarring machine, " Coleman " " Prosama " sand mixing and disintegrating machine, and two types of sand sifting machines.

W. & B. Cowan,

Victory Works, Stretford, Manchester.

Messrs. W. & B. Cowan are showing on their stand a full size specimen of the new form of gas-works station meter known as the " Bell " type meter. This is the first time this form of meter has been exhibited in public. It has created much interest among gas engineers at the works of Messrs. Cowan, in Manchester. The " Bell " meter marks a new departure in the design of station meters, and some of the advantages claimed for it are: (1) It is a positive meter; (2) it is cheaper than the wet drum meter; (3) it occupies very limited



" BELL " STATION METER.

space; (4) it has great capacity relative to size; and (5) drum type station meters can be converted to the "Bell" type, thereby increasing their capacity to more than double the volume of gas with an appreciably smaller loss of differential pressure. (This conversion can be carried out *in situ* without disturbing existing foundations.) Specimen meters of 30,000 and 3600 c.ft. per hour are to be seen at work on the stand. They are arranged so that the internal mechanism can be inspected. A number of these meters, ranging in sizes from 10,000 to 200,000 c.ft. per hour, are already in use and giving satisfaction.

On this Company's stand there is also on view a new form of iron-cased dry meter known as "Cowan's Ferro-Meter." It is large in capacity though small in bulk, and is constructed to withstand high pressures. The casing of the meter is practically indestructible, and the design of the gas passages together with the method of transmitting the motion from diaphragms to index are, it is claimed, unique. It is easy of

"Cowan's" Ferro-Meter.

repair, and will appeal to companies doing their own repair work.

Messrs. Cowan are also exhibiting various other articles of interest to gas engineers, including a station governor, a retort house governor, with the Brown & Holton patent distance control, consumers' meters, pressure gauges, water meters, &c.

Saml. Cutler & Sons, Ltd.,

39, Victoria Street, S.W. 1.

This firm are exhibiting a series of photographs of their manufactures—comprising gasholders of the ordinary guide-framed type, and with the Cutler system of guide-framing, gasholders on the spiral system, and also of the Klönne waterless type. The exhibit also includes photographs of examples of the various contracts the firm have carried out in water gas plant, hydrogen plant, coal and coke handling plant, purifiers, condensers, gas-works apparatus, steel tanks, steel-framed buildings, and general constructional work.

Davis Gas Stove Company, Ltd.,

London and Luton.

(Radiation Ltd., Proprietors.)

This Company are again well represented with a fine example of individual effort, in their "Alpine New World" cooker—a porcelain-enamelled production with every conceivable improvement, both in labour saving and efficiency. Among the very interesting designs of gas fires shown is the Davis "Cleopatra" in antique armoured copper finish. The Davis Company's long experience in geyser construction gives special significance to their exhibit of this class of appliance, the "New Shamrock" geyser being a fine example shown. A "Balance" 3-loop radiator is also shown, while a "Nautilus" coke boiler demonstrates another of the activities of the well-known Davis organization.

W. H. Dean & Son, Ltd.,

Victoria Works, Burnley.

Among the exhibits of this firm are gas heated washing coppers. Some of these are fitted with strong steel outer casing, and porcelain enamelled black and white mottled finish on the exterior, which only requires wiping down after use with a damp cloth in order to retain their appearance as new. There are also other types having double casing, the cavity packed with silicate cotton, and outer casing stove enamelled blue, green, or chocolate colour as desired. Some of these boilers are fitted with a reversible wood lid, which is very serviceable when space is limited, and all types can be fitted with brass draw-off tap for emptying, if desired. Other exhibits include combined wash-boiler with bath attachment; combination boiler for heating milk, &c.; copper urns for counter use; boilers fitted with rustless cast-iron pan for ham boiling, &c.

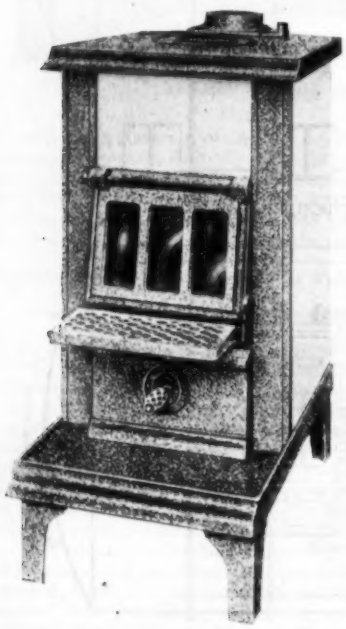
Demonstrations of a new gas heated washing machine are taking place.

Bryan Donkin Company, Ltd.,

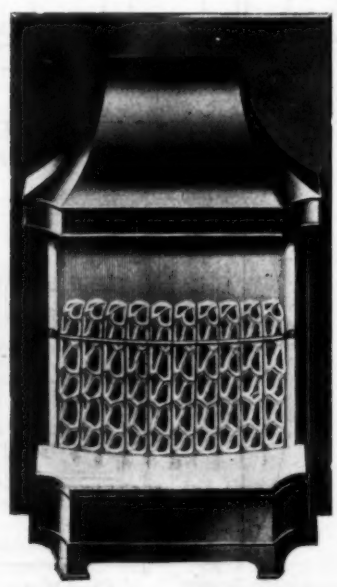
Chesterfield.

Among the numerous photographs which are displayed by this firm are many examples of Rateau turbo exhausting plants. The Company hold the licence for the manufacture of turbo exhausters, compressors, boosters, and blowers, and have now supplied over 280 to gas-works, coke oven installations, &c. For the last 75 years the Company have been making exhausters which are now used in all parts of the world, in gas-works and for many industrial purposes; the total number being upwards of 7000. Models are exhibited on the stand of the two-blade and three-blade type exhausters.

Another speciality of the Company is gas valves, which they have been making for over eighty years. Last year the sales



Nautilus Domestic Boiler "E" Pattern.



Davis "Antony" Fire.

Davis "New Shamrock" Geyser.

reached a total of over ten thousand valves. Models are exhibited of high and medium pressure double-faced valves, the well-known single-faced rack and pinion valve, and worm and rack valve, and also a disc valve for use with purifiers. We might also mention that the Company have recently supplied a very large number of special coke oven valves up to 60 in. diameter for the Coppee plant to be erected in Australia.

A photograph is shown of an installation of special Reynolds' high-pressure district governors at Kings Norton which are reducing the gas pressure from 15 lbs. per sq. in. to the normal supply pressure. Photographs are shown also of other types of gas governors and regulators of which many thousands have been supplied for district and service work.

A new product being shown is a patent sub-soil ventilator box, designed with the three-fold object of ventilating the sub-soil to any depth beneath the impervious top surfaces of roads and footpaths and providing a vent by which escaping gases can be carried harmlessly to the atmosphere; to minimize the possibility of dangerous explosives accumulating under the road surfaces; and to serve as an indicator of the position of mains. The ventilator is adjustable as to level, and can be fixed to suit any depth of road material and arranged so that the lid is flush with the surface of the road. Besides being a road ventilator, it also acts as a leak detector, and in the event of an escape of gas under roads where these boxes have been installed, a gas leak indicator will record the percentage of escaping gas.

The Company are among the pioneers of the high-pressure system of gas distribution in this country. Their specialities also include rotary and reciprocating gas compressors, pressure blowers for industrial purposes, and oil spraying plants to prevent naphthalene troubles. The Company have recently supplied to a gas-works in the South of England the special compressing plant and governor for the first static holder scheme to be installed in this country, for the purpose of boosting a low-pressure main during periods of maximum consumption. This plant is fixed in the outlying district in which the pressure requires to be raised and where one or more reservoirs can be installed. The compressor is the rotary multi-blade type capable of compressing the gas up to 60 lbs. per sq. in., and direct coupled to an electric motor. The starting of the compressor is controlled by one of their specially designed regulators which automatically starts the plant when the pressure in the main from which the gas is drawn reaches approximately 4 in. W.G. The compressor automatically stops if this pressure falls to about 3 in. W.G. or when the required pressure is reached in the storage tanks. The delivery of the gas from the storage tanks to the main is controlled by one of their Reynolds district governors. This design is quite suitable for reducing a pressure of 60 lbs. per sq. in., or even higher down to ordinary district pressures in one stage. This governor automatically comes into operation when the pressure in the main falls to 3 in.

A description of this plant was given in a paper read before the Institution of Gas Engineers by Mr. F. G. Gorman—"The Incident of the Peak Load" (see "JOURNAL," Vol. 186, p. 747).

The Bryan Donkin Company is now developing in this country a high-speed turbo exhauster designed on the Rateau principle for speeds up to 10,000 r.p.m.

E.B. Refractory Cement Co., Ltd.,

147, Corporation Street, Birmingham.

This firm are exhibiting a full range of fire cements covering all refractory requirements, acid, basic, and neutral; also fire-resisting refractory paints, tamping mixtures, and gun cements. The "E.B." refractory cements are shown actually bonding arches of refractory bricks showing the strength of the joint cold, and further tests at extremely high temperatures. The "E.B." cement gun is exhibited, and demonstrations are being given daily, showing the wonderfully simple and efficient manner in which instant repairs can be carried out. Expert cement gun representatives are in attendance at the stand.

The "E.B." one-shot way is a quick and effective method of repairing leaky gas retorts. The method employed is the forcing of a special cement into the cracks at a pressure of approximately 35 lbs. by means of the "E.B." patented gun. The method of operation is simplicity itself. The gun is charged with "E.B." cement; the operator, from the bottom staging or floor, inserts the gun through a specially prepared cover, places the bell-mouth over the leak, and pulls the trigger. The cement is forced into the crack, adheres instantly upon contact with the hot surface of the retort, and effectively seals the leak. The whole operation is a matter of a few seconds. The cement is the result of years of experience and practical research in refractory problems.

Economic Gas Boiler Company, Ltd.,

Guy Street, Gannow Top, Burnley.

The "Economic" gas boilers to be seen on this stand offer a wide range from which to select the most appropriate for particular needs; there being many new patterns included in this year's display.

The "Economic" No. 6, finished in grey mottled porcelain enamel, requires only a small amount of attention after use to retain its new appearance. The No. 8 boiler, which is very strong, meets with approval where economy of space is essential. Having a full open top and circular wooden lid, it serves the purpose of a little table after the wash-day needs are supplied. The B.2 boiler is made with cast aluminium top, galvanized case, and combined steam and fume outlet.

The No. 5, with white porcelain enamelled top rim, is a new line which meets the demand for a strong and well finished boiler at reasonable cost. The No. 2 packed gas wash-boiler is also to be seen on the stand.

Those in search of boilers with bath-supply attachments will find specimens here.

Evesons (Coal), Ltd.,

134, Edmund Street, Birmingham.

The display by Messrs. Evesons, of Birmingham, is on a much larger scale than last year's exhibit, and will undoubtedly prove to be very interesting to buyers of house, steam, manufacturing, and gas fuels, particularly the last named, as Messrs. Evesons are experts in this particular section, having a large gas-works connection of sixty years' standing. Their exhibit comprises an actual twelve-ton railway wagon built by the firm at their Albion Works, West Bromwich, specially fitted inside to accommodate the many samples of different fuels which they are exhibiting. In addition, a very complete display of chemical bye-products is shown as produced by one of the colliery companies for whom Messrs. Evesons are agents. This exhibit is particularly interesting, not only to the actual user, but to the general public as an education regarding what can be extracted and produced from coal.

Falk, Stadelmann, & Co., Ltd.,

83-93, Farringdon Road, London, E.C.

The material displayed on this stand is gathered from a very wide range of appliances, because of their novelty. The "Silo" gas fires are provided with a special patented self-lighting apparatus. The small and semi-portable gas fire, the "Focus," has created a new sphere of usefulness.

Their "Bakerloo" and "Reliable" cookers are of the most up-to-date construction and design. A determined effort has been made to enhance the appearance of the cookers.

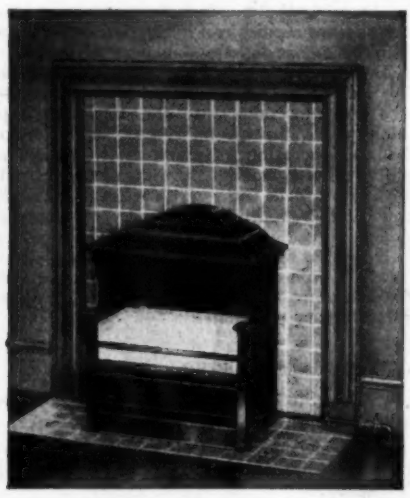
The lighting fittings are modelled on the new panel type, and are contrived in such a manner that their application and control are easy. The "Veritas" inverted burners are well-known to gas engineers; but a detailed display of certain integral parts is planned, so that the salesman and other officers on the distribution side of the industry can familiarize themselves with the building up of the complete patterns.

The gas mantle display, showing material from its genesis to the completed article, together with specimens of the earth and other chemicals required for their composition, has always evoked interest, as it emphasizes some of the vast number of processes through which the yarn is subjected before the finished product is evolved.

Sidney Flavel & Co., Ltd.,

Leamington.

This firm show modern appliances, among which mention may be made of an improved type of open domestic fire for burning smokeless solid fuel. This fire is made in various types and many designs, covering almost every need. The illustration shows an "Independent" model which may be



"Independent" Model Fire.

placed in front of an ordinary fireplace as in the case of a gas fire; and in addition to this, there are types for converting existing coal fires, an example of which may be seen burning; basket grates for the open hearth, and parlour type grates obtainable with or without back boiler for hot water circulation.

The modern gas cooker in many useful designs may also be seen, together with a display of gas fires, including a special gas fire of imitation wood logs, which burns in such a manner as to give the same appearance as the ordinary wood fire.

Fletcher Russell & Co., Ltd.,

Warrington.

(Radiation Ltd., Proprietors.)

This firm show their "Kingsway New World" gas cooker in "Rado" porcelain-enamel finish, having the "New World" principle of oven design. The range of other Fletcher appliances shown includes the "Celerity" water heater (a nickel-

"Kingsway New World" Cooker.

plated, highly efficient appliance of unusual merit), also the "Hamilton" gas fire, as an example of Fletcher's oxidized copper finish. This firm's "Embassy" radiators will be much admired as showing one of the latest methods of flexible gas-heating systems of entire dependability.

Foster & Pullen, Ltd.,

Avil Works, Crossley Hall, Bradford.

Foster & Pullen, Ltd., display a very complete range of lanterns and burners for public lighting. It is being increasingly realized that a definite improvement can be effected in the lighting of most roads by the use of burners in alignment, and a special feature is therefore made of burners of this type. Up to the present these have generally been fixed in lanterns of what may be described as orthodox designs. In effect, they have simply taken the place of the previous cluster burners, with no alteration beyond a modification of the shape of the reflector and ventilating funnel. It will be easily understood that this practice imposes very narrow limits on the size of alignment burners. In an inverted lamp anything beyond

No. 1.

five or six nozzles necessitates the use of a very large and expensive globe, while square lanterns have to be increased in size until they become unwieldy.

With the object of overcoming these drawbacks, Messrs.

Foster & Pullen, Ltd., have introduced two new inverted lanterns which merit special description. One of these is oblong in shape, with burners of any desired size in alignment. The glass at the bottom is fixed in a " V " shaped hinged frame, of heat resisting quality, and each piece can be renewed separately. Made in this way the lantern is comparatively small, and even the twelve-light size is quite compact. These lanterns are, of course, intended for suspension over the roadway so that the light is evenly directed up and down the road.

The second lantern has been introduced for use where it is necessary to fix near the line of the kerb. It may be described as a " bi-directional " lantern. Two alignment burners are

No. 2.
Foster & Pullen's Registered Designs.

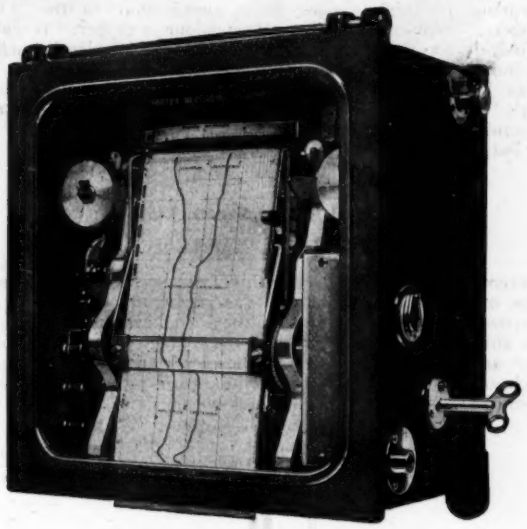
fixed at a predetermined angle to the centre line, with the narrow end facing the roadway. Photometric tests show that the maximum distribution of light is up and down and across the roadway, while the causeway is also adequately illuminated.

These lanterns appear to possess advantages which merit full investigation.

Foster Instrument Company, Ltd.,

Letchworth, Herts.

Included in the exhibit of pyrometers and automatic control shown by this Company, is an interesting and novel application of their " Strip " recorder. The instrument is shown actually in service not only making a record of the temperature in the furnace, but controlling that temperature automatically. The combination thus shown is particularly convenient in discontinuous operations where the furnace has to be controlled at any given temperature for short periods. The recorder gives the " history " of the successive heating periods for future reference, and, at the same time, shows up to the last minute the temperature actually existing. The apparatus demonstrates, by a very clear record, how accurately the automatic control regulates the temperature at the desired figure.



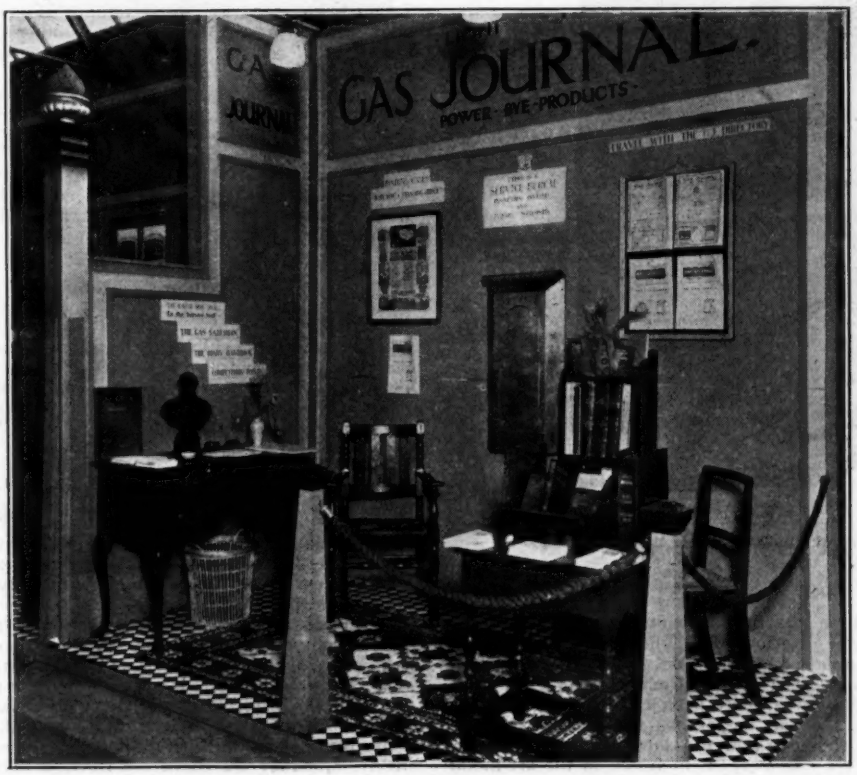
Foster Instrument Co.'s " Strip " Recorder.

An important factor in the success of this piece of apparatus is the incorporation of the " Resilia " spring mounting and incidentally an enlarged model of this particular system is also shown. The periodic depression by means of which the control is actuated and the record is made inevitably produces a slight periodic strain upon the delicate pivot points carrying the moving system actuating the recording arm, and if it were not for the " Resilia " spring mounting, which gives freedom from shock, not only axially but in all directions, the tendency to wear on the pivot points might be serious.

" Gas Journal " and " Gas Salesman,"

11, Bolt Court, Fleet Street, London, E.C. 4.

In recent years, Walter King, Ltd., have been of assistance to many visitors to the Exhibition, and again this year they have their service bureau in the Gas Section. The " GAS JOURNAL " is now in its 82nd year; a bound copy of the 1849



volume on the stand affords an interesting comparison with the four quarterly volumes which nowadays go to make a complete year. Even these do not show the industry's leading technical publication in its latest form; the make-up having been still further modernized from the beginning of the present year. A feature is the new "Gas Salesman," which, after appearing for eight years as a supplement to the "GAS JOURNAL," now appears in a two-colour wrapper. It caters exclusively for the ever increasing sales and service branch of the industry. The firm's other publications are shown—the "GAS JOURNAL" Calendar and Directory," the "Gas Salesman's" Diary and Handbook; "Competition Points for Gas Salesmen;" and various text books in connection with the gas industry.

General Gas Appliances, Ltd.,

Guide Bridge, Manchester.

Foremost in the display of this firm is the comprehensive series of "Governor-General" gas cookers now made up of nine sizes. The chief points of these cookers are economy of fuel, simple automatic control of oven, utility and cleanliness. They are fitted with the "Economic" auto-heat regulator, which ensures that the correct temperature is maintained with the minimum consumption of gas.

"General" Indirect Water Heater.

In addition to these practical advantages, the decorative aspect has not been overlooked. The mottled porcelain enamelled finish is enhanced by a new development in the introduction of the willow pattern design of exterior enamels.

Several new designs have lately been added to the popular "High Peak" series of art metal gas fires, all fitted with "Gen-Ray" super radiants and the latest burner construction. A new departure has been the inclusion in the art metal series of the "Magna" inset and "Cheer U" gas fires, and special attention is called to the "Gen-Ray" convex radiants fitted to each of these fires. The "General" steam and "Nonsteam" gas-fired radiators are compact, easily handled, and quickly installed.

Cooker with Willow Pattern Design.

A feature is the "General" indirect hot water heater shown under actual working conditions. This indirect heater can be easily fitted to any existing household hot water system.

General Refractories, Ltd.,

Wicker Arches, Sheffield.

This stand is unique in the fact that it takes the form of a small model of an actual round downdraught kiln, complete with chimney.

The firm believe only in refractories produced in Britain, and are offering materials of every description to compete with foreign producers, claiming that they can successfully combat foreign competition whether on the score of price, quality, reliability, or prompt delivery.

They are making a special feature of their "Insulite" insulating bricks, and the stand actually shows a layer of "Insulite" bricks in the kiln wall. Another special feature is "Pyrolyte" cement, which is a high-temperature cement that is claimed to withstand any commercial heat. In addition, the firm are displaying British sands for all classes of foundry work; firebricks, magnesite bricks, chrome bricks, silica bricks, and all other types of refractory bricks for furnaces and other purposes.

It is their policy in the production of refractories to use mills, motors, and engines made only by English firms, and the motive power is produced by coal from British mines in the winning of which British colliers are employed.

Gibbons Bros., Ltd.,

Dibdale Works, Dudley.

This firm are exhibiting a full selection of high-efficiency retort settings, and also a section of the new patented floor for enamelling muffles. Designs and photographs of furnaces and tunnel kilns are shown; and there are samples of tiles and ware fired through their Dressler tunnel kilns.

George Glover & Co., Ltd.,

Ranelagh Works, Chelsea.

This firm are concentrating on their latest production—the "Chelsea Three" meter. This is an exceedingly ingenious and efficient prepayment meter of a new type which marks an era in the production of this class of mechanism. It widens the service usually expected from prepayment meters. The salient feature of the mechanism is a tapered coin pocket into which any of three coins—viz., 1d., 6d., or 1s.—may be dropped. The coin is arrested as it travels down the pocket, and engages between the teeth of a relevant toothed wheel mounted on a spindle. There are three wheels, geared, of course, in the ratio of 12 : 6 : 1 for the shilling, sixpence, and penny respectively, and they are connected through suitable gearing to the valve opening mechanism and counting train of the meter, so as to allow a proportionate supply of gas to pass through the meter in accordance with the value of each coin inserted. Whatever denomination of coin is inserted, only the relevant wheel is brought into operation by rotation (by the consumer) of a handle

attached to the pinion spindle, the other two pinions "free-wheeling," as it were. At the end of its travel, the coin is released into the money box.

It is not possible to operate the mechanism with a halfpenny or a farthing, as neither of these coins can engage with the gear wheels, and they fall harmlessly through to the cash drawer when the handle is turned. Further, by an ingenious cut-out, it is impossible to insert a second coin in the pocket until the first has been released by operation of the mechanism.

George Glover's New Patent "Chelsea Three" Coin Meter.

The quantity of gas to be delivered per penny is shown in cubic feet on the price-change indicator, and, when this is set by the gas undertaking at the desired amount, the setting automatically determines the quantity to be delivered by the sixpence or the shilling.

The setting is simply effected by a slotted screw of such design that, unless it is firmly screwed home, it prevents operation of the mechanism. When the price-changer has been set, the cover is replaced, and the insertion of the cash drawer beneath automatically locks the cover in place, and a padlock on the cash box makes a complete unit.

The adoption of the "Chelsea Three" meter not only affords great convenience to the housewife, overcoming the annoyance of not having coins of the correct value always handy, but, from the gas undertaking's point of view, overcomes the necessity for continually changing meters, or the cost and labour involved in altering the mechanism of those already installed, which even then retain only a one-coin capacity. A further advantage to the undertaking is the saving of space in the stores, and the saving of capital outlay, by reducing the variety of meters held in stock.

The "Chelsea Three" is now being supplied in No. 2 and No. 3 Standard sizes, and we understand that high-capacity meters will be ready shortly. This meter was fully described on p. 255 of the "JOURNAL" for Jan. 29.

Thomas Glover & Co., Ltd.,

Gothic Works, Angel Road, Edmonton, N. 18.

An attractive exhibit is provided by Messrs. Thomas Glover & Co., Ltd., where visitors may view a complete gas meter testing installation, as supplied to Weights and Measures Authorities throughout the Kingdom. This installation comprises two 11 c.ft. test gasholders, test table, pressure gauges, speed cocks, cone connections, and all essential fittings, made in accordance with the Board of Trade regulations. The pressure gauge scales can be adjusted to the water level. The test holder can be fitted with monel metal bells.

Another interesting item is the Wilson gas sampling holder. In this case the holder is not for testing meters, but for obtaining a sample of the make of gas over 12 or 24 hours. The result of testing samples collected over such periods is more truly representative of the average calorific value than the result which is obtained by testing at intervals, when the quality may be above or below the normal.

Samples of the latest type of meters are the chief items of the remainder of this firm's exhibits. These are in glass and also in metal cases.

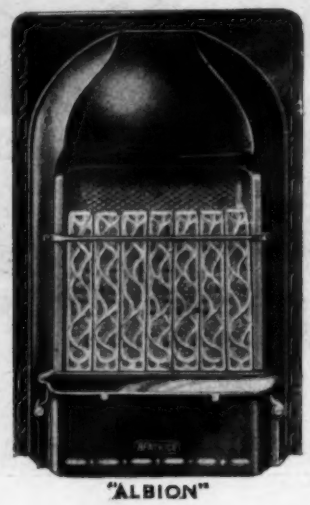
John Harper & Co., Ltd.,

Albion Works, Willenhall.

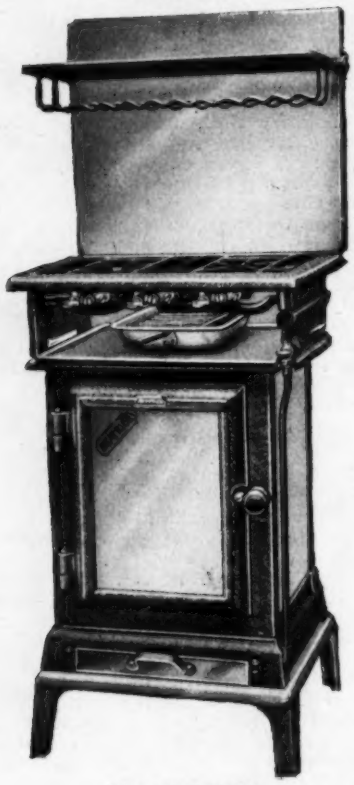
The important exhibits on this stand are "Beatrice" gas fires and cookers. The fires are finished in art black and vitreous enamel in various colours. These enamels are impervious to damp and can easily be kept bright and in condition as new by wiping over occasionally with a damp cloth. The "Beatrice" fire is sturdily, but simply constructed. The injector fitted to these fires is of simple fool-proof construction with a minimum of adjustments to obtain silent burning with complete incandescence of radiants. The fires are shown in various sizes and in a big variety of finishes.

The "Beatrice" cooker is shown in one size only. The oven is large enough to take six 2-lb. loaves at one baking. A specially designed flue outlet ensures correct temperature to all parts

of the oven. The hotplate is of straightforward design and fitted with two boiling burners and one grill burner. The boiling burners can be supplied as turret or drilled ring to order. The cooker is strongly made; and the oven lining is of special



"Albion" Fire.



"Beatrice" Cooker.

insulating material which has successfully passed long and critical tests. Samples of these cookers are shown in mottled enamel and also a "De Luxe" model finished in blue and white.

W. C. Holmes & Co., Ltd.,

Whitestone Iron Works and Turnbridge Foundry, Huddersfield.

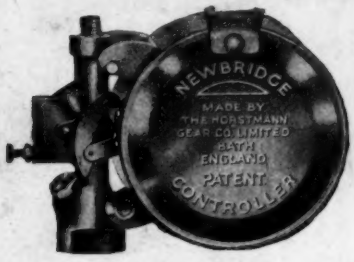
This Company are exhibiting actual working examples of "Connersville" meters, and blowers, which are in operation, and models of their various bye-product recovery plant apparatus. A small example of one of the firm's quick-opening double-faced Western valves specially adapted for purifier work is to be seen, together with photographs and drawings of various specialities. In addition, they are showing on the stand a cinematograph film, which has been recently taken, showing the actual construction in the works of their various plants, such as "super" condensers, rotary washers, "D & L" centrifugal washers, and also a full range of the "Connersville" products—meters, exhausters, boosters, &c.

This film will be available later for the use of the various technical organizations in the industry and for exhibition to students and works staffs, &c.

Horstmann Gear Company, Ltd.,

Newbridge Works, Bath.

The Horstmann Gear Company, Ltd., of Newbridge Works, Bath, are exhibiting a very complete range of Newbridge automatic gas controllers for public street lighting. Prominence among the clock controller exhibit is given to the type 3A/UNI. "Ironclad" controllers for suspension and vertical harp lamps are also on view. These controllers possess a number of important features, embodied as a result of 25 years devoted to the production of controllers.



Type 3A/UNI Controller.

"Newbridge" Positive Distance Gas Switch.

The most interesting side of the exhibit from the point of view of the general public is the Newbridge positive distance gas switch for indoor lighting, which was first on view at the last British Industries Fair. As a result of a questionnaire in the autumn, improvements have been embodied in the 1930 range of gas switches, including a hand control of better appearance with a knob giving better finger grip. These switches are now also available with flush or sunk hand controls, thus enabling an improved artistic effect to be obtained. An improved type of by-pass has now been standardized with these switches, and tests have proved that not only are they considerably more economical than the old pattern supplied, but they are also practically wind proof.

The duplex sets with junction boxes for controlling one light from two switches, or alternatively two lights from one switch, are shown.

Hurry Water Heater Company.

39, Broad Street, Birmingham.

This firm are exhibiting a full range of their special lines of water heaters suitable for housing schemes, including gas heated portable coppers, some models of which are fitted with their patent bath attachment on the overflow method. There is a display of No. 10 cylinders with connection for supplying hot water for bath, also for kitchen use, with automatic feed. The "Hurro Pimpel" hot water circulator with thermostat control, for supplying hot water to all taps, which is made in three different sizes, is also on view.

Hygienic Stove Company, Ltd.,

St. Thomas' Road, Huddersfield.

North Country people pride themselves on their baking abilities. Bread baking needs a roomy, well-ventilated oven. Yorkshire ovens in variety are shown here.

One special feature about "Hygienic" cookers is the smallness of the hotplate relative to the size of the oven. In modern houses every inch of space is valuable, and this compactness is appreciated by architects and others who are interested in housing problems, as cookers of this type can be fitted in very cramped spaces. An interesting unit is a water heater that provides for that ever-recurring need for small quantities of hot water with means for varying the temperature at which that water will be maintained without attention and delivered as required. It will also give boiling water, and so do the duty of a kettle. Here are also shown instantaneous water boilers that are made in a number of sizes to provide freshly boiled water for any number up to 300 persons from one unit in a very short space of time and make a perfect infusion of tea. Another item worth noting is a combination washing boiler and bath water heater that does both duties well. This should interest housing authorities. The last item is a water heater for rough work that is claimed to be foolproof and undamageable, except wilfully.

The firm have a display of gas fires in chrome, oxidized, lustre, and black finishes.

Incandescent Heat Company, Ltd.,

Birmingham.

A novel feature is a patent combination reversible recuperative and regenerative furnace. For high-temperature operations, such as billet heating for forging, drop stamping, firing of refractories and pottery-ware, the furnace gives the maximum efficiency of the reversible regenerative type, and, in addition, can be operated as a continuous recuperator without reversing for the maintaining of dead even temperatures over long periods, such as are required for carbonizing, close an-

nealing, &c. All temperatures up to and including 1500° C. can be readily attained and maintained within very critical limits. Reducing, oxidizing, or neutral atmospheric conditions are obtained at will. The furnace embodies all the latest furnace engineering practice, is robust in construction, and meets the requirements of practically every industry. The furnace exhibited is fired by means of town gas, but is equally suitable for washed or crude producer gas.

A further novel feature is the patent incandescent supernatural draught gas-fired furnace. This introduces a new system of recuperation as applied to natural draught gas-fired industrial furnaces. Each gas inlet and combustion port is fed by an independent bank of recuperator tubes, so arranged that the maximum heat from the waste gases is delivered to the air required for combustion. Both recuperation and insulation are incorporated to their respective practical and economical limits. This furnace has a temperature range from 500° to 1100° C., and a very high thermal efficiency is obtained. The furnace can be seen in operation fitted complete with electric automatic temperature control gear and pyrometric equipment by the Incandescent Heat Company, Ltd.

A further feature of the exhibits is a standard semi-muffle recuperative type furnace suitable for general heat treatment work. This exhibit is, of course, of considerable interest to both the large and small engineer, as it meets the requirements of the heat treatment shop and tool room. There is also displayed tool-room equipment, including plants for the heat treatment of high speed, carbon, and special alloy steels; also a plant for the forging and heat treatment of aluminium, duralumin, and similar alloys. Another exhibit of special interest is a new type liquid hardening furnace, which can be arranged for gas firing with either natural draught or air blast, and is also equally suitable for oil firing. Some of the main features of this furnace include top heating, large storage capacity, and ideal gas flow without direct flame impingement on the container.

A full range of photographs and drawings are available of the most up-to-date heat treatment and quenching machines, conveyor type normalizing plants, automatic bright annealing machines for ferrous and non-ferrous metals, continuous billet heating and rolling mill furnaces, and air-heating equipment, so that the requirements of all industries and every furnace user are catered for. The exhibits also include examples of porcelain enamelling on cast-iron and sheet steel, which have been carried out by incandescent patent enamelling equipment, and with "Pomco" enamels which the Incandescent Heat Company, Ltd., are supplying to all the leading enamellers.

Joint Testing Exhibit.

In view of the interest which is being shown at the present time in the examination and testing of appliances and materials used in the industry, it was decided to demonstrate what is being done by the Gas Light and Coke Company at Watson House and by the City of Birmingham Gas Department in these directions. A co-operative exhibit has therefore been arranged on these lines which it is hoped will make three appeals:

To the General Public.—An informative display which should interest the gas consumer from the point of view of demonstrating the care and attention which is being devoted by the gas industry to the design, construction, efficiency, and safety in use of all types of gas consuming appliances.

To Gas Appliance Manufacturers.—A demonstration showing the various tests which are carried out by the two undertakings in connection with the safety and efficiency of appliances, strength of materials, &c. It should interest the manufacturer from the point of view of indicating the possible lines on which new appliances should be constructed and the design and strength of various fittings employed in the utilization of gas.

Administrators of Gas Undertakings.—A demonstration to show the method of testing various appliances, fittings, and materials used in gas distribution; and to act as a bureau where information may be given to engineers of undertakings relating to the various tests which are made, and suggestions be received from engineers as to their possible requirements in the matter of tests.

Joymanco (Brighton), Ltd.,

Cambridge Grove, Wilbury Road, Hove.

This firm display gas meters, gas meter components, and paints for gas meters.

Lighting Trades, Ltd.,

30-31, Farringdon Street, E.C. 4.

A joint exhibit for Lighting Trades, Ltd., and the Welsbach Light Company, Ltd., has been arranged in the centre of the Gas Industries Section, comprising incandescent gas mantles, burners, lighting fittings, fires, &c. If any evidence were wanted of the manufacturing ramifications of these important Companies in the incandescent mantle industry, it is to be found in the large circular pyramid arranged in the centre of the stand. Rows upon rows of mantles of every conceivable shape and size, varying from a small inverted mantle measuring ⅜ of an inch high to an upright mantle measuring 9 in. in height, are displayed upon the tiers of the pyramid, conveying at a glance how thoroughly these Companies have achieved their aim to meet all the requirements that might be made of them. Specimens of some of the most important types of soft mantles for gas and oil lighting, in which these Companies specialize, are also shown on the stand.

To meet the many and varying tastes in the matter of modern lighting equipment, Lighting Trades and Welsbach have collected a splendid selection of fittings, including pendants for glass shades, bowls and silk shades, brackets, table standards, and floor standards.

Among the burners exhibited a prominent place is allotted to "Renown" superheater cluster burners which are now made in 2 to 10 light patterns for bijou or No. 2 size mantles. The chief advantages claimed for "Renown" burners over those constructed of metal are:

(1) That being non-corrodible the lighting efficiency is unimpaired over a long period of use.
(2) That the elimination of corrosion results in reduction of labour costs.
(3) That the special construction of the interior produces maximum efficiency on the lowest possible gas consumption and ensures silent lighting and extinguishing.

Fires include the "Handiheater" in 5-tube and 7-tube types, the "Kern" 10-tube type in a variety of pleasing enamel finishes, and the "Glasmi."

Donald Macpherson & Co., Ltd.,

Knott Mill, Manchester.

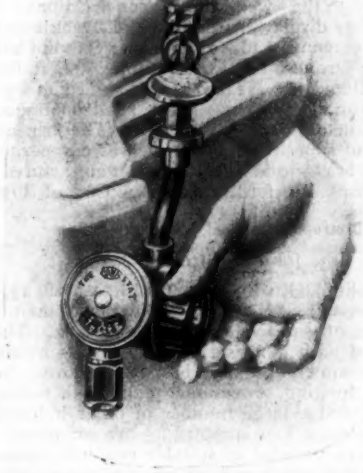
The trend of modern times on the part of gas and other engineers to give greater consideration to the question of making their gasholders and structural steelwork more attractive in appearance and more in keeping with the amenities of the neighbourhood, has prompted this firm to demonstrate the possibilities. On their stand they are showing what can definitely be achieved in this direction. This more attractive appearance is not obtained at the expense of the wearing properties of the paint used, nor is greater cost incurred.

In addition, they are showing other interesting exhibits, such as specimens of work done with "Foochow" decorators' materials, which materials are specially prepared to resist the excessive amount of fumes and deleterious acid gases prevalent on a gas-works; specimens of coach, engine, and exhauster enamel finishes; and many varied types of industrial finishes. From the point of view of the distribution side of a gas undertaking, a special meter enamel undercoat, weatherproof and non-chipping, is sure to attract a deal of attention.

R. & A. Main, Ltd.,

Gothic Works, Falkirk.

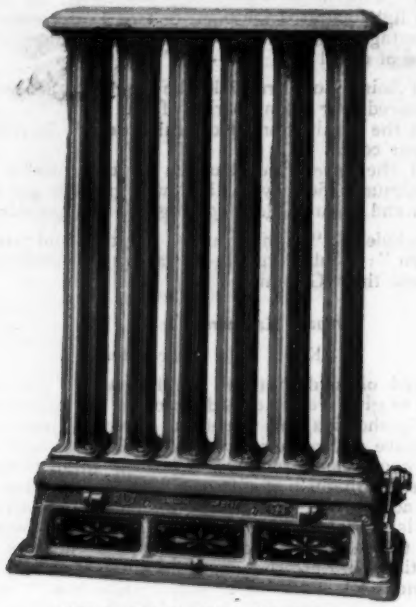
This stand houses a comprehensive display of the firm's most recent manufactures in gas cooking and heating appliances. Domestic cookers designed to brighten the kitchen, lessen labour, and increase efficiency are shown in the new "Mainamel" finishes—deluxe, mottled, and mottled "B." These cookers are fitted with the patent "Conservor" oven, which uses little gas and gives an even temperature from top



The "Mainstat" Automatic Cooking-Control.
The safety oven locking-tap is also shown.

to bottom, enabling cooking to be done on every shelf—even the bottom one. The oven heat is controlled by the red dial front-view "Mainstat," which is easily read, accurate in working, and assures the most successful cooking results being repeated time and again with certainty.

The gas fires on view combine efficiency with artistry of design, and are shown in electro-bronze, armour bright, sheathed copper, lacquer colour, and chromium finishes. Upright and inset types are displayed; also the portable "Mainscreen" fire, which can be converted into a firescreen when not in use. All the fires are equipped with the "Raymain" radiants, which heat up rapidly with an even glow from top to bottom, and give out a smooth, comfortable heat.



"Unimain" Gas-Heated Radiator.

Another form of heating apparatus is the "Unimain" gas radiator. An entirely new design of radiator, every part is so accessible that it can be dismantled for cleaning or repair in five minutes—even if situated in a recess. The "Unimain" is shown in various sizes and in black and old gold finishes. There is also the "Romain" heater, of novel wall panel design, having a large radiating surface and small projection from wall, giving good distribution of heat and saving space.

Meltham Silica Fire Brick Company, Ltd.,

Meltham, Huddersfield.

The exhibit of these manufacturers consists principally of a built-up silica coke oven wall, and built-in sections of vertical and horizontal silica segmental gas retorts and a general display of various shapes and sizes for the heavy industries. Among the well-known constructional engineers whose shapes they display are the Woodall-Duckham Oven and Construction Company, Ltd., of London; Simon-Carves, Ltd., of Manchester; Drakes, Ltd., of Halifax; Robert Dempster & Co., Ltd., of Elland, &c. They have supplied many full coke oven batteries, and are at present engaged on important contracts for constructors on the Continent. The firm also display varied samples of super-refractories such as magnesite, chrome, and silimanite bricks and blocks, as manufactured by their allied firm, Messrs. Pickford, Holland, & Co., of Sheffield.

Metropolitan Fuel Company, Ltd.,

43, Johnson Street, S.W. 1.

The Metropolitan Fuel Company, Ltd., of 43, Johnson Street, Westminster, S.W. 1, are showing on their stand the "Cox" system of surface combustion of gas. This system has been applied with most satisfactory results to air heating, core drying, enamelling and bronzing stoves, immersion burners, metal melting, sweetmeat and confectionery trades, tobacco drying, and a large number of other industries.

The heating elements or combustors are composed of porous refractory material encased in suitable cast-iron containers. A correctly proportioned gas and air mixture passes through this porous refractory and burns without flame on the surface. Combustors can be manufactured in any rectangular or circular form, or in tubular form with either external or internal heating surfaces. Interesting exhibits of some applications of this revolutionary system are on exhibit; while a competent staff is available during the whole time the Fair is open to discuss or advise on any particular adaptation according to specific requirements.

National Gas Engine Company, Ltd.,

Ashton-under-Lyne.

Together with various types of oil and heavy fuel engines, this firm are exhibiting their "K" type gas engine. These engines are the development of over forty years' experience. The working parts are few, and all the latest improvements are embodied, together with special features covered by patents. The design secures accessibility to all bearings and working parts, and the general provisions are such that the effects of wear, the amount of gas and lubricating oil consumed, ease of cleaning, and other important features in the working of a gas engine are on the most efficient lines. They are particularly suitable for driving fans, gas exhausters, shafting, domestic and dairy appliances, &c.

New Geysers, Ltd.,

25 and 27, Addington Square, London, S.E. 5.

The domestic water heater is such an important element in the development of the use of gas that much interest will be found in the various appliances exhibited (some for the first time) by New Geysers, Ltd. Chief among their improved bath geysers is the "Super Reliance," with its access base for facilitating the cleaning of burner, drip trough, &c., without disconnection, its convenient taps and—less apparent but very important—its unusually substantial construction. The "Two-Way" is a geyser which, from its situation by the scullery sink, provides hot water for domestic purposes and also for a bath on same or upper floor. A more complete service is given by the "Autogazer," entirely automatic, and operated by the turning on or off of any tap, in any part of the house. It is especially designed for cold water feed from cistern, to accord with water regulations.

Another range of heaters demonstrates the "Storage" type, in which the water is pre-heated and kept hot in readiness for use at any tap; waste of gas being prevented by a thermostatic valve and non-radiating covering. The "Storot" is designed for the small "labour-saving" house, and needs only a small gas supply, requires no flue, and consumes less than 1½ c.ft. of gas per hour for heat-maintenance. A further development is the "Instor," a combination of geyser and storage principles, operating at will in either capacity and offering the conveniences of both systems. In the "A" type "Instor" the heating element is a geyser which heats the water so rapidly that an immediate and unlimited supply is available at any time at any tap; in the type "B" the geyser section provides ample hot water for the sink tap; and a larger supply for the bath is obtained by opening a valve connecting the storage reservoir. In either case the gas is controlled by a thermostatic valve, and requires no attention. Other storage heaters for local supplies, improved vent fittings, &c., are also shown.

W. Parkinson & Co.,

Bell Barn Road, Birmingham.

On the stand of Messrs. W. Parkinson & Co., there is a very complete range of gas meters of various types, including those for ordinary consumers and those of the prepayment pattern. Among the dry meters are some of specially high capacity, and there is also shown a range of test meters for experimental purposes, specially designed for a very high degree of accuracy. There are also models of large wet meters, both cylindrical and rectangular.

In governing apparatus this firm is showing, in addition to models of the ordinary station governor, an actual governor tank adapted for pressure loading, together with the pilot governor used to load the main governor. The pilot governor can, of course, be fixed at a distance from the main governor, and the conveniences of this system of regulating the pressure on a district are obvious.

To deal with the lighting of streets and outdoor spaces, there is on view a varied assortment of lamps, including those of square, circular, and hexagonal design, as well as a range of arc lamps. The "Blackpool" pattern patent lamp is also shown, having the burners in tiers, and so attaining an important increase in the illuminating effect of any given number of mantles. The loss which occurs in the ordinary ring burner, owing to the mantles screening one another, is minimized by this arrangement. Moreover, the fact that the mantles are placed farther away from one another, increases the diffusion of the light. The design is naturally intended in the main for the more important positions, and the advantages obtained by its use are much more marked with a large unit than with a smaller one. In addition to the actual lamps, the latest types of pre-heated inverted burners are shown, particularly those having the mantles in alignment. All these burners are now metallized, to prevent corrosion from the products of combustion.

A new feature for street lighting is the "Sheffield" patent directional reflector. This design has the effect of collecting light rays which would, in the ordinary lamps, be largely wasted owing to their travelling out in a direction in which the light is not actually needed. With the "Sheffield" reflector such rays are collected and thrown in the direction in

which they will be most useful. For instance, in ordinary street lighting the reflector is used to send the rays along the street, and to use for this purpose rays which would otherwise be expended in lighting up the fronts of buildings close

Parkinson "U" Fixing Lamp, with Mantles in Alignment.

to the lamp. This, and other reflectors, are shown finished chromium plated.

The "Beasley" recording gas calorimeter is shown on the stand, complete with pressure and temperature correcting mechanism and automatic waterlining tanks. This instrument, while requiring the very minimum of attention, gives a record of the calorific value in B.Th.U. per c.ft. corrected to normal temperature and pressure, irrespective of variations in barometric pressure or temperature or density of the gas.

Parkinson "U" Fixing Lamp, with Mantles arranged in Three Tiers.

There are a large number of other exhibits on view, including pressure gauges in great variety, both of the double tube and single tube pattern; main thermometers, vaporizers, force pumps, &c.

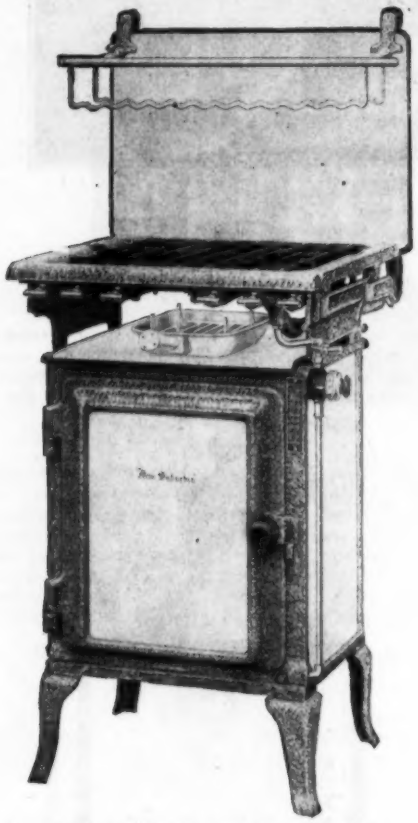
Parkinson Stove Company, Ltd.,

Stechford, Birmingham.

To be noted particularly is this Company's big display of high-grade porcelain enamelled gas cookers in various finishes. Attention will be focussed on the Parkinson "New Suburbia" cooker—with top and bottom oven flue outlets—which is claimed by the makers to give very good results with a small gas consumption. This single-burner oven gas cooker embodies in its construction all the best features of the double-burner top-flue type of oven. Each of the two flues possesses a distinct and useful function. The top flue is intended to govern

the ventilation of the oven during the initial stages of heating up, and the bottom flue to ensure complete circulation of the hot gases throughout the oven when combustion has attained stable conditions. The top flue is thermostatically controlled by a patented device which ensures that this flue is wide open during the period of heating up the oven, and offers the most efficient method of ventilating the moisture, or condensation, produced by contact of the hot gases with the cold frame of the oven interior. It also ensures an adequate supply of secondary air to support combustion of the gases. When complete combustion is assured, proper circulation of the hot gases set in motion, and the oven free from condensation, this top flue is automatically closed off and the bottom flue operates. When the top flue has closed off and the bottom flue is in operation, the circulation of the hot gases throughout the oven is complete, which enables the whole of the interior of the oven to be used for cooking purposes.

Prominent also on the stand are models of the well-known "Suburbia" cooker. The distinctive features embodied in this series are rounded corners of oven to facilitate cleaning; the sides, back, and door packed and enamel lined; self-locking oven grids; detachable and interchangeable oven gates; high efficiency hotplate burners with improved top bars.



Parkinson "New Suburbia" Gas Cooker.

The "Holborn" gas cookers have many features which make for comfort in the kitchen. The oven is packed and lined to retain the heat and the hotplate is spaced for convenient use. The burners (as in all Parkinson cookers) are scientifically designed to give rapid and intense heat with the utmost economy of gas consumption.

The "Stechford" is a highly efficient and compact gas cooker which admirably meets the cooking requirements of two or three persons, or for bachelor flats, and is the ideal appliance for small families or where kitchen space is limited. The "Standard" cooker is an achievement in the direction of standardization, reducing maintenance costs to a minimum. Provision for one-level cooking is exemplified in the "Cabinet" cooker. A moderate priced cooker, combining reliability and economy, is offered in the "Liverpool" and "Kennington" series.

The display of Parkinson hygienic gas fires, all of which are fitted with the special "Sun-Ray" radiants, to give heat similar in healthful properties to that of the sun, is certain to attract more than ordinary attention. To be particularly noted are the new sheathed metal gas fires. In this new series of fires the fronts are encased in actual metal, in a choice of brass, copper, or pewter, with hand-beaten effects, complete with solid fenders and dogs. The fender tops are highly polished or chromium plated. These fires ensure a perfect harmony with their surroundings.

The Company make a special feature of convection-radiant gas fires, as typified in the "Conrad" series. The term convection-radiant, as used in connection with gas fires, signifies a fire constructed to give pure radiant warmth with a high percentage of convection efficiency. By means of a suitably lagged heating-chamber, pure air is drawn up through the cold air inlet at the base of the stove, and emerging above the radiant rays of the fire diffuses a current of pure heated air through the room. The air inlet is raised sufficiently above the base of the stove to prevent dust particles being drawn into the chamber.

"Treasure" Geyser.

Distinctive in appearance and specially designed to fit in front of an existing coal grate, the Parkinson "Cosie" gas fires will attract attention. The swing trivet and boiling burner are useful accessories in the bedroom or nursery. Four alternate types of fenders may be fitted to the "Cosie," ensuring a wide range of adaptability in varying settings. The Parkinson Stove Company were the originators of the modern built-in gas fire register, which has achieved a great measure of popularity with architects, builders, and those responsible for municipal housing schemes. In the building of the popular artisan types of houses, great economies are effected owing to the fact that registers do not require such large flues as coal fires, because

Luminous Radiator.

the volume of the products of combustion is less. Deep chimney breasts are therefore unnecessary, and may be entirely dispensed with, if desired, which will considerably increase the area of the room and floor space. The installation of built-in registers eliminates the necessity for cutting floor joists, as the

cast-iron hearth provided can be placed with safety direct on to the flooring boards.

For water heating, attention is centred on the improved "Treasure" geyser in the new chromite finish with chromium plated fittings. In this latest model the interior is detachable, giving easy access to all parts for the purpose of cleaning or renewals. A special feature is the swing-round body which permits the geyser to be fixed in any desired position convenient to the bath and makes it easily adaptable to any special conditions which are likely to be met with. The gas is controlled by an automatic valve which operates only when water is passing through the geyser, thus ensuring a plentiful supply of hot water with a minimum gas consumption.

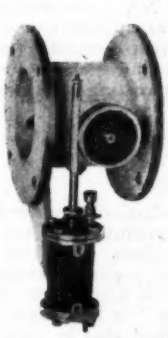
Housewives desirous of minimizing the labours of washing-day should carefully examine the Parkinson gas-heated rustless wash-boilers which are designed on the most convenient lines for use in the scullery, kitchen, or wash-house. A new type of luminous gas-heated radiator is shown, with other interesting examples, and special gas cooking apparatus for use in hotels, works' canteens, restaurants, &c., is represented.

Peebles & Co., Ltd.,

Tay Works, Bonnington, Edinburgh.

Messrs. Peebles & Co., Ltd., are showing gas meters and several of their special gas governors. The gas meters comprise "Standard," ordinary, high-capacity, and a special small-cased meter; also the prepayment meter. Details of the special points of interest in these designs are particularly the patent telescopic diaphragm ingeniously fixed to the rim by an endless coiled spring, which, while keeping the diaphragm absolutely gas tight, allows for all small irregularities in the thickness of the leather. The diaphragm is held by the spring in equal tension all round, and there is no fear of cutting the leather. No heating or soldering is required. The next important feature is their patented cork stuffing for the spindles, which, while tight at all pressures, causes far less friction than is the case with ordinary stuffing, and there is no need for lubrication beyond the original graphite dressing, which gives smoothness of working without noise. There appears no sign of wear or deterioration of any kind even after prolonged use. The prepayment meter of the front change plate type has the attachment and valve outside the meter, the operating spindle passing through a small stuffing box so that the meter is gas-tight. In the high-capacity meter the valves are enclosed in the usual valve chamber. The top of the meter is not used as a passage, and the chamber is consequently an extra protection should the top be damaged in any way.

With regard to governors, Messrs. Peebles & Co. show their station and district governors. For years they have supplied pressure loaded district governors, and more recently the principle has been used with their station governors. The original patent for pressure loading was granted to the late Mr. D. Bruce Peebles in 1875, but it did not seem to be appreciated. In recent times, with heavier pressures to be dealt with, this system has come into vogue. The alteration of the pressure by a clock is easily carried out. A clock arrangement is shown dealing with charted weekday pressures and a special chart for Sunday. A pilot governor loads the main governor from the inlet gas pressure. The loading of the pilot governor is carried out by means of a small cup of mercury attached to a lever acting on its spindle. The clock sends a small plunger of any desired shape into the mercury, the buoyancy increasing the load gradually or in steps as required to any extent. A cam driven by the clock deals with the weekday pressures, while a separate cam is brought into action for Sunday. The change



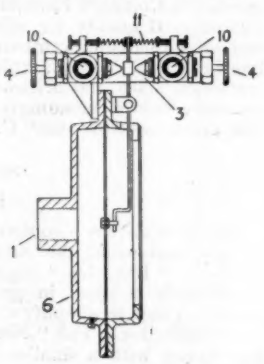


Fig. 1.—Butterfly Valve and Operating Cylinder. **Fig. 2.—Relay Control in Section.**

over from one cam to the other automatically takes place usually after midnight on Saturday and Sunday. The cams are alterable for sunset, and may be combined in any number for different days of the week. This is a most interesting development of pressure loading.

A governor for station governing is the patent self-loading governor, which increases the pressure according to the load. Want of space makes the showing of the governor a difficulty, but the automatic arm with a running weight is shown attached to the counterbalance lever fitted up on the cover for the automatic unit. The patent "B.V.R." governor is of the relay type moving a butterfly valve. A small supply of air or gas (20-30 c.ft. per hour) at high pressure (at about 5 lbs. per sq. in.) acts on either side of a piston attached to the butterfly. A light diaphragm in communication with the point at which constant conditions are required moves a little piston valve, which directs the high-pressure air to either side of the piston attached to the butterfly. The movement of the piston at once moves the butterfly. To show how delicate it is, the diaphragm can be moved by waving a sheet of paper lightly in front of it.

Fig. 1 shows the butterfly valve and operating cylinder, while fig. 2 illustrates the small diaphragm control. This governor is useful for retort house governing, but it is also suitable for many other conditions.

Other exhibits show the numerous governors for consumers, street lighting, and domestic individual lights, while Peebles' jet photometer and heat indicator are also shown. The firm have so many specialities that it is only possible to show and describe a few of them.

Radiation Limited.

The exhibits of the six constituent firms of Radiation Limited are described under their respective names.

Rainsford & Lynes, Ltd.,

Emily Street, Birmingham.

This firm have a display of brass fittings, including a selection of gas main cocks in various sizes and patterns which is of considerable interest to gas engineers. The firm's display also includes the usual range of unions (from castings, hot pressings, or rod), and a number of models of special fittings such as they make for several of the large concerns in the gas industry.

Richmonds Gas Stove Company, Ltd.,

Warrington.

(Radiation Ltd., Proprietors.)

The "Bungalow New World" gas cooking range shown on this stand will be found to carry simplicity of working to the farthest point, and at the same time its appearance lacks nothing that would help to please. The flint-hard "Rado" porcelain enamel of the finish is entirely reliable in resistance to wear, and its cleaning is a matter of moments only. This range has, of course, all the popular "New World" features of "Regulo" oven-heat control, &c., and many others. A "Bungalow New World" cooker of smaller capacity, all in mottled porcelain enamel, is also seen on the stand.

Richmonds "Equator" Gas Heated Circulating Boiler.

Among several exceptionally handsome designs of gas fire on this stand, the well-favoured "Stuart" with dog fender must be given pride of place. Richmonds also show their new "Equator" gas-heated self-contained hot water circulating boiler. It supplies large or small quantities of hot water at any moment at any tap—scullery, bath, and lavatory basin—which

it serves. It gives a complete and ample hot water service at surprisingly short notice and at a trifling cost. With the full gas supply of 55 c.ft. per hour, sufficient water for a hot bath is available in 40 minutes starting from cold, after which the "Equator" will continue to provide for an additional hot bath every 40 minutes, for as long as required.

The "Perfectea" boiler is among the water heating appliances.

Ruud Manufacturing Company, Ltd.,

99, High Holborn, W.C. 1.

This Company manufacture a complete range of automatic gas water heating systems suitable for small domestic use, upwards to mansion, hotel, industrial or commercial undertakings. Continuous flow and storage models are manufactured, enabling every conceivable demand to be properly satisfied with the fullest economy and efficiency. Ruud systems are controlled by the famous Ruud all-metal thermostat—a thoroughly reliable control, holding temperatures at all times within rigid limits. A unique feature is the automatic cut-off fitted to the storage models. This provides that should the pilot light become extinguished, either accidentally or otherwise, the gas is immediately shut off at the main.

Automatic Cut-Off.

Ruud gas water heaters are complete systems, being self-contained units, suitable for fixing either directly off the main, or off the cold storage tank. The gas when not actually in full use is shut completely off, leaving only a small pilot jet, with no large by-pass consumption, or continually burning gas. Ruud systems are extremely well designed, thus reducing maintenance to a minimum. The design of the Ruud multi-coil heaters is particularly interesting where large installations are fitted, as the system of employing multi-coils enables easy cleaning and maintenance, without arresting the hot water service of the building.

The Ruud Company make a high-quality product, using British materials and British labour exclusively.

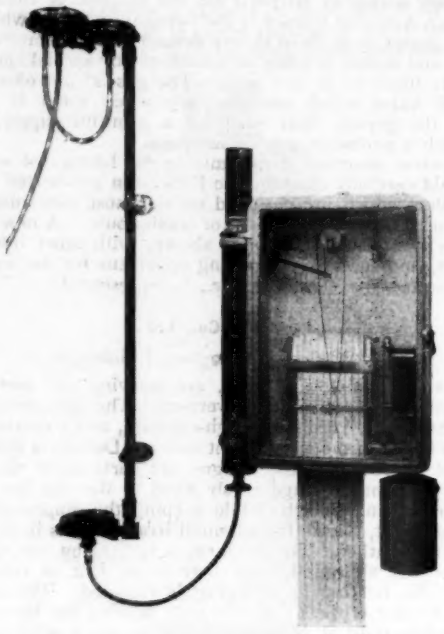
Sigma Instrument Co., Ltd.,

Letchworth, Herts.

This firm are showing their "Sigma" pressure recorder which uses a tape chart of length for 14 days' or 28 days' use. The time movement of the chart is the same in both cases—namely, $\frac{1}{4}$ in. per hour, and the width of the charts is $4\frac{3}{4}$ in. A drum carries the unused portion of the chart, and a second drum, in front, automatically winds up the chart after use. A choice of two clocks is available—one for a running period of 14 days, and the other for 28 days. The clock has a jewelled escapement, and is completely enclosed in the clock drum. Operation of the recorder is by large flexible aneroid boxes. It is particularly sensitive, and free from frictional errors and temperature errors. Adjustment of the pen reading is by the screw on the left, which varies the distance between the aneroid boxes and the axis of the pen lever. The pen lever is independently pivoted, and so balanced that the pen pressure on the paper is a constant small amount. The complete recording mechanism is supported in the case by pivots fixed to the top and bottom. By releasing a spring, the mechanism may be swung out, thus giving access to the keyhole of the clock, to its speed adjustment, and to the chart drums. The recorder with the 14-day clock weighs 12 lbs., and the outside dimensions of its case are $14\frac{1}{2}$ in. high by 9 in. wide by 7 in. deep.

Another instrument exhibited by this firm is the "Sigma" recording calorimeter. With this apparatus the flow of gas is maintained constant, independent of pressure and temperature, by an orifice between two pressure governors, and the heat of combustion expands one steel tube relative to a second steel tube, the expansion operating the recording pen. Accuracy is achieved with simplicity. The flow of gas is regulated by two governors, an upper one and a lower one, the diaphragm of the latter being 6 ft. below that of the upper governor. The gas flows from the upper to the lower governor through an orifice, the size of which controls the volume of gas. The lower governor is adjusted to a pressure of approximately $\frac{1}{4}$ in. w.g. and the upper governor 8/100 in w.g. higher. The difference is the average pressure difference in the air at the levels of the two governors. The difference is important, and necessary to ensure a constant flow when the specific gravity of the gas is variable, or when the temperature or pressure of the atmosphere changes.

The steel expansion tubes are on the left of the case of the recorder. An outer tube protects them from draughts and supports the burner. The expansion tubes consist of a central tube inside which the flame burns, and a larger surrounding tube. The lower ends of the two tubes are rivetted together; the upper end of the outer tube is fixed to the case, while the upper end of the inner tube operates the pen mechanism. The tube expansion is transmitted to one end of a horizontal beam which passes into the case, and is fixed to it at its right hand side.



No. 3 "Sigma" B.Th.U. Recorder.

To the beam is fixed a pivot which operates the lever of the pen mechanism. The pivot is formed by a flat strip of steel a few thousandths of an inch thick, stretched across a forked casting. The lever is fixed to its centre and to the centre of a similar but stationary pivot. By the use of these pivots frictionless and positive magnification is obtained.

The flame burns inside the central tube, taking its air from the top of the outer shield tube.

The chart is $4\frac{3}{4}$ in. wide, and moves $\frac{1}{4}$ in. per hour. The ruling is in percentages above or below the declared calorific value, 1/10th in. representing 1 p.ct. The recorder may be used in any place in which the temperature is fairly uniform, and where there are no unequal draughts blowing on the breathing holes of the governors. It is made for fixing to a wall. Erection is simple, and neither water nor other liquid is required.

Stourbridge Refractories Company, Ltd.,

Shut End Works, Pensnett, Nr. Dudley.

This firm has an attractive display of their various specialities which are finding a ready market through the country. A good range of shapes are shown, these including highly refractory firebricks. Leading lines are vertical and horizontal special bricks, segmental retorts, furnace lining bricks and blocks, chequer bricks, &c., refractory insulating blocks, coke oven bricks and blocks of every description.

Realizing the need for special cements for work with their goods, the Company have placed upon the market various special mixtures—B quality for silica work; No. 4 for fireclay work, and special patching cements for special purposes; their leading line being "S" brand, which is in great demand for stopping cracks on silica and brickwork. They have also a monolithic cement which is exceedingly useful for casting bricks for use in temperatures below 1000° C.

Stoves, Ltd.,

Rainhill.

This firm display a comprehensive selection of modern domestic gas appliances, the outstanding product being the famous series of "Bakerloo" high-grade cookers. Neat in design, handsomely finished in grey mottled porcelain enamel, and raised on legs to simplify cleaning, their appearance is exceedingly attractive. The "New Reliable" is an equally efficient gas cooker with a smaller oven finished also in grey mottled porcelain enamel.

A patent reversible grilling or boiling burner supplied with "Bakerloo" and "New Reliable" cookers gives an additional full size boiling burner to the hotplate when the grill is not in use, and is a unique feature. A very useful gas cooker accessory is the "Autokook"—an oven heat regulator which keeps the oven at the required temperature for cooking and eliminates guesswork. The new "Falcola" finish as applied to "Silo" gas fires opens up fresh possibilities in decorative schemes. "Silo" fires are also shown in oxidized copper, oxidized silver,

and oxidized brass. These finishes demonstrate how utility can be combined with artistic appearance. The "Rapid" lighter is a novelty for lighting gas cookers, and dispenses with matches.

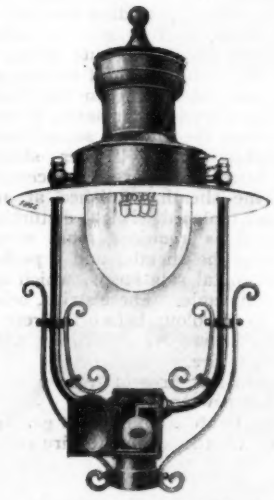
Other exhibits are the "Argyll" small hotplates and "Glide" gas irons—both in porcelain enamel and art black finish.

William Sugg & Co., Ltd.,

Westminster, S.W. 1.

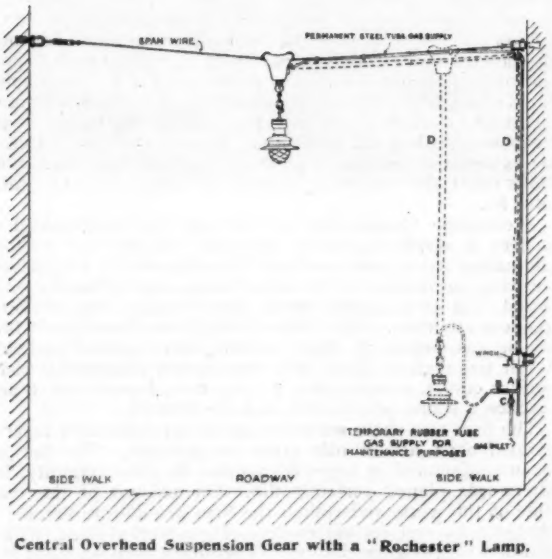
Among gas cooking appliances are four models of the "Berkeley" range in mottled-enamel, three being of the floor fixing type and the fourth the well-known No. 3 model on stand. Special features worthy of attention are the improved thermostat and new type of bottom flue outlet shown on a No. 1 model, while another similar model demonstrates the luminous oven burner. The "Swift" cooker in mottled enamel, on a stand similarly finished, is a very neat and efficient cooker, and will appeal to those who have to cater for the smaller houses and flats.

The firm's series of "Red Sphinx" fires represent their contribution to the heating-by-gas movement. The incurved fuel formation, providing efficient ventilation, and the patent atomizer which ensures silence, are the principal constructional features of these fires, and their appearance is pleasing. Four specimens of the inset-conversion type are included, one of them being complete with red brick surround and overmantel, and another demonstrating an interesting system of by-pass control. There are also many models of this fire in "independent" form, as well as the "interior" type for setting into flat-fronted fireplaces.



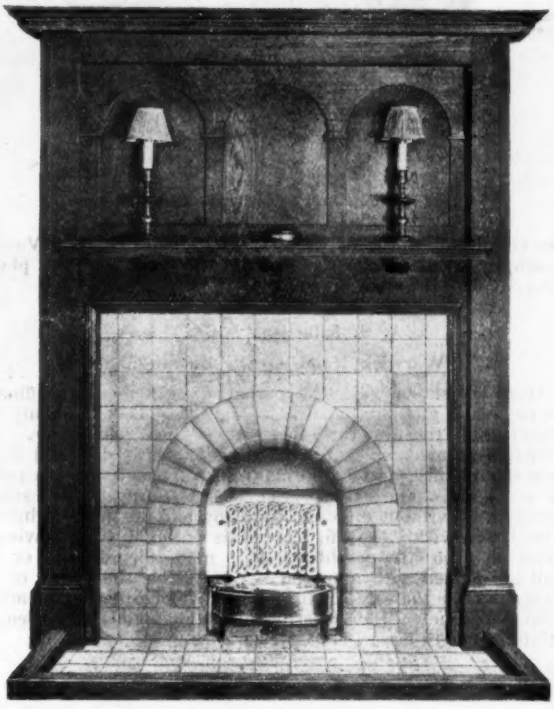
Showing how a Controller is carried in the Cast-Iron Base of an Upright "Littleton" Lamp.

Showing a Controller at the top of a "Rochester" Suspension Lamp.

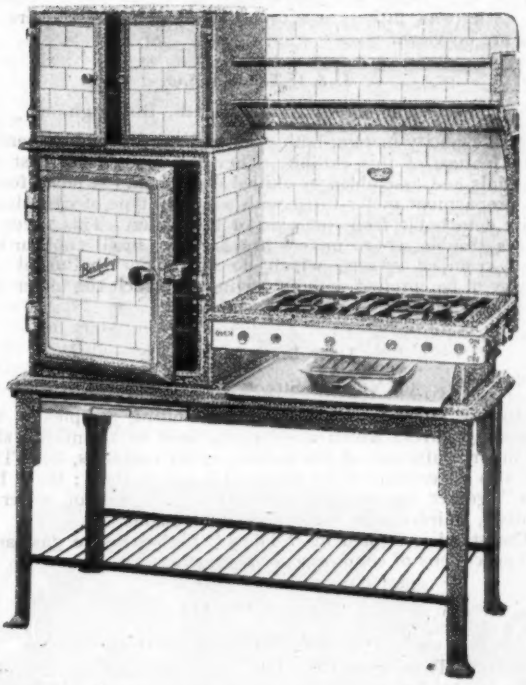


Central Overhead Suspension Gear with a "Rochester" Lamp.

In the matter of gas for lighting the exhibit covers a wide range—from a domestic burner on a standard bracket to a 15-light "Swanley" lamp, giving 1500 c.p. Between the two are many items of interest, including the "Flambeau" bracket lights, the "Bon Marché" indirect pendant with large reflector, ventilating ceiling lights, the "Littleton" lamp in its upright form, and the "Rochester" suspension type, the "Promenade" lamp, which is in demand for street lighting on new estates, the "Windsor" square lamp, and many others. The firm's patent distant control device is demonstrated on several of the fittings, while central suspension gear for street lighting is shown.



"Red Sphinx" Inset Fire with Firebrick Setting.



The "Berkeley" Cooker, No. 3 Stand Model.

There is a big demand just now for the upright "Littleton" and "Rochester" suspension lamps—the latter for affixing to tramway standards or for centrally suspended overhead lighting—in connection with the various schemes of improved public lighting.

A novelty recently introduced by the firm is the gas fire-lighter, which was designed by the Technical Department of

Sugg "King's Hall" Ventilating Ceiling Light.

the Gas Light and Coke Company at Watson House. Various examples are exhibited, and flexible tube cocks, floor plates, &c., are also shown.

A. G. Sutherland & Co., Ltd.,

Warwick Road, Greet, Birmingham.

Here are shown various types of dry gas meters—ordinary, prepayment, gas fire, and high-capacity. The Company are showing for the first time the "AGS" two-coin meter. The prepayment mechanism fitted to this meter is designed in an original manner, and can be adapted to receive either a penny or a shilling. The change is effected instantly by two simple movements without disconnecting any part of the attachment. The "Warwick" gas fire meter is a small type, having a capacity of 30 c.ft. per hour. It is made for 1d., 6d., or 1s., and is supplied with a special key to enable the owner of the meter to close the valve *in situ* at will. Open meters of various kinds are shown for closer examination; and glass demonstration meters are to be seen working.

Sutherland Meter Company, Ltd.,

Witton, Birmingham.

On this stand are displayed gas meters of all types, and test gasholders, washers, scrubbers, purifiers, gasholders, station meters, &c. Brass and gunmetal main cocks and all types of gas cocks and fittings are to be seen; and gas cookers and fires are on view.

J. & J. Taunton, Ltd.

Sherbourne Road, Balsall Heath, Birmingham.

High-capacity meters, both ordinary and prepayment, are the main feature of this exhibit. They are made from first-class materials and assembled by skilled craftsmen. A novel feature is a prepayment meter fitted with a special type of cash drawer easily detachable from the side of the meter. This saves collectors trouble where meters are fixed in small cupboards or other cramped spaces, which do not allow the usual cash drawer to be emptied without having to detach the meter from its supply pipes.

Tilley Brothers, Ltd.,

39, Victoria Street, S.W. 1.

Messrs. Tilley Bros., Ltd., are exhibiting samples of their soldering stoves, which are largely used in tinsmiths' shops for the manufacture of gas meters, motor radiators, &c. There are also advertising signs fitted with gas flashers; the "Hendon" geyser for heating small quantities of hot water for dentists, hairdressers, factory lavatory basins, &c.

The stand is lighted by "Tilley" high-pressure gas lamps, and specimens of compressors are shown.

Timmis & Co., Ltd.,

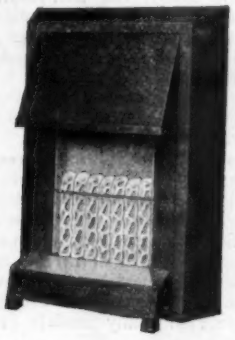
River Stour Works, Stourbridge.

Messrs. Timmis & Co., Ltd., are showing an interesting range of bricks with a very high grog content. It has long been known that a high percentage of grog (previously calcined fireclay) very largely increases the resistance of the brick both to chemical action and thermal shock. Messrs. Timmis & Co., Ltd., have carried this to "a logical conclusion," and are supplying bricks made entirely out of grog. This is a most interesting exhibit, in that it forms a class of refractory which (state the makers) differs in its physical properties as widely from the ordinary fireclay brick as the ordinary fireclay brick does from silica.

F. Turner (Art-Metal), Ltd.,

61, 62, and 63, Summer Hill Street, Birmingham.

On the stand of this firm is to be seen a range of their art-metal surrounds, which are displayed in suitable settings, and are complete with hearths and curbs to match. Very interesting is their art-metal sheath for gas fires. This is an entirely new patented idea by means of which an ordinary type gas fire may be converted into a metal-sheathed fire with the minimum of trouble and at a moderate cost. There are many points in this sheath which will appeal to gas undertakings.



Turner Gas Fire Sheath.

The sheath can be fitted to the fire in a very short time by the gasfitter on consumers' premises; it is not necessary to bring the fire in to the works for fitting, providing the size of the fire is known. Consumers often wish to have a metal-sheathed fire in place of an existing black fire, but, owing to the cost of a new sheathed fire, they cannot afford to change. Even if they arrange with the gas undertaking to take back their black fire and make them an allowance for same, it does not help the gas undertaking, as they then have a second-hand fire which may be difficult of disposal. A Turner sheath would in a case of this kind benefit all parties concerned. Should it be required to have the sheath refinished at any time, it can easily be removed and replaced without disturbing the fire. If an art-metal surround is required, this would be in the same metal and finish as the sheath; and a perfect match is therefore assured. The metal side strips, which adjust to the width of the fire, are removable. These strips, being close to the radiants, are liable to discolour before the rest of the cover, but they can easily be removed for refinishing without disturbing the sheath or the gas fire.

Sheaths will be made in sizes to suit fires of from 7 to 11 radiants, and in brass, copper, and pewter finishes.

Illustrated here is a sheath fitted to an ordinary type gas fire, which gives a good impression of the complete fire when fitted.

C. & W. Walker, Ltd.,

Midland Ironworks, Donnington, Nr. Wellington, Salop.

This exhibit consists of some 50 photographs of various gas-works plant erected by the firm in various parts of the world, including spiral-guided and guide framed gasholders from 12½ million c.ft. capacity downwards; purifier installations, including those of Sydney, Melbourne, Bradford, Stoke, Bournemouth, and other large installations. Also shown are photographs of dry Klönne, and spherical pressure holders, welded steel mains, tar stills, steel and cast-iron pipes and connections, washer scrubbers (vertical and horizontal), Livesey washers, "P. & A." tar extractors, condensers (with vertical and horizontal tubes), tanks (steel and cast-iron), sulphate of ammonia stills, saturators, &c.

A complete Milbourne roller carriage for spiral-guided gasholders is displayed, which speciality is provided with self-lubricating axles, and is of steel throughout, its long bearings ensuring parallelism in the axles for an extraordinarily lengthy period, and its method of lubrication obviating the necessity of frequent attention. This roller carriage has found great favour among gas engineers when installing spiral-guided gasholders. A full size section of the Milbourne-Beard indiarubber pad for purifier covers, which, since its inception, has proved in actual practice a sound proposition, is to be seen.

The firm also show several types of flat grids with taper and parallel bars, also hurdle grids for purifiers. The flat grids are manufactured in a special manner to ensure rigidity, being afterwards planed perfectly flat. On account of the magnitude of the work undertaken the firm are able to exhibit only photographs and certain models of gas-works plant, with the addition of a few specialities. They have been engaged in the manufacture of gas-works plant for most parts of the world for upwards of 70 years, and the quality of the workmanship and the care taken in the design and manufacture of plant are well known throughout the whole of the gas industry.

George Waller & Son, Ltd.,

Stroud, Glos.

The firm are exhibiting a number of photographs illustrating their specialities in gas-works plant, including exhausting machinery, gas boosting and compressing plant, various types of pumps, the " Retriever " pan ash separating and coke

breeze washing plant, hydraulic truck tippers, " Reeson " retort house governors, and coke breakers. There is also on their stand a small " Michell " patent crankless compressor.

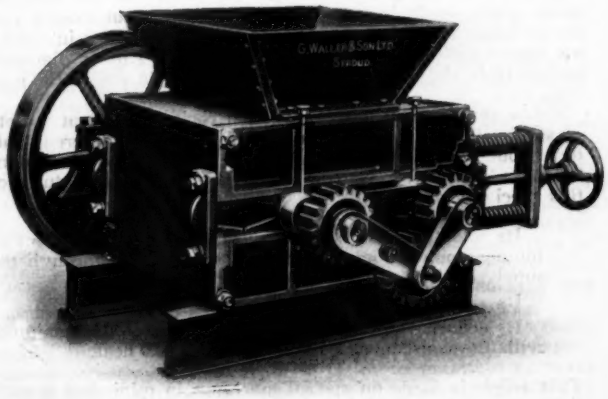
The Company have specialized in exhausting machinery since the early days of gas supply. They claim to be the original patentees and makers of the four-blade rotary exhauster, which is now a recognized type, and in use in numberless gas-works. The firm make these exhausters in a wide range of sizes, for dealing with from 1000 to 500,000 c.ft. of gas per hour. Attention is drawn to steam turbo boosting fans for raising the pressure of gas throughout the district where required. These are specially-built enclosed fans, direct coupled to steam turbines. Small boosting fans are arranged for gas engine drive through counter-shafting. There are illustrated various types of gas compressors as follows:

Rotary compressors, built on the lines of the four-blade exhauster for boosting purposes, or for transmission of gas through small mains, up to a discharge pressure of 5 lbs. per sq. in., and arranged for steam, gas engine, or electric drive; and reciprocating compressors for transmission at high pressure. The firm have a complete range of sizes of these machines, horizontal, vertical, single and duplex type, usually arranged for steam tandem drive with either single or compound engines.

Messrs. Waller are the sole licencees in this country for the " Michell " patent crankless compressor, an entirely new development of highly efficient mechanical design. The model shown on their stand is of this type and is a three-cylinder single-ended machine, having a capacity of 10,000 c.ft. per hour at a maximum delivery pressure of 85 lbs. per sq. in. when running at a speed of 1000 r.p.m. A descriptive sectional drawing of a similar tpye of machine is shown. We illustrate five sets of " Michell " compressors each for dealing with 500,000 c.ft. of gas per hour with discharge pressure of 7 lbs. per sq. in. Each is driven by a 300 B.H.P. " Michell " crankless gas engine. In connection with high-pressure boosting plant, the firm supply a complete range of district reducing governors.

Messrs. Waller are sole licencees in this country for the manufacture of the " Retriever " pan ash washer, which deals with pan ash material from the retort furnaces, and recovers the coke, which usually varies from about 25 p.ct. to 45 p.ct. The dust is also recovered, and is marketable for concrete block work, while the clean washed clinker is suitable for road-making. The " Retriever " plant can also be used for producing clean washed coke (separating from this the impurities) for domestic boilers and industrial purposes. Samples of the separated materials are exhibited, with a sectional drawing illustrating the working of the plant.

The firm have supplied a large number of hydraulic truck tippers for up-ending and discharging coal from trucks to the coal bunkers, for gas-works, electric power stations, &c. By the use of these, labour is greatly reduced, and a truck is emptied



in from three to five minutes. They are the sole makers of the "Reeson" patent retort house governor, which is of the dry diaphragm type. Great advantages are claimed for this over the usual hydraulic water seal, bell, and tank type of governors.

Another speciality is coke breaking plant, and we illustrate their "Phœnix" coke breaker.

Waterless Gasholder Company, Ltd.,

13, Rood Lane, E.C. 3.

Waterless gasholders of the "M.A.N." type are well represented. Apart from constructional drawings, photographs, adequate descriptive literature, and progress statistics, there is shown a scale-model of the waterless gasholder; in which the operation of the disc (or piston) may be clearly noted. Another interesting exhibit is an actual section of a waterless gasholder which is under construction for a leading English iron and steel works. This section will enable visitors to make close inspection of the sealing arrangements.

Welsbach Light Company, Ltd.,

344, Gray's Inn Road, W.C.

(See Lighting Trades, Ltd.)

West's Gas Improvement Company, Ltd.,

Manchester.

This Company display a striking new series of photographs which illustrates some of the installations of Glover-West vertical retorts erected by them in important cities of the home country, the British Empire, and foreign countries, and recently put into operation. A set of photographs of "small jobs" illustrates Glover-West carbonizing units erected in small gas-works whose annual outputs are in the region of 60 million c.ft.

A complete working model operated by electricity demonstrates the simultaneous action of the West lip-bucket conveyor. A miniature chain of lip-buckets encircles a small-scale replica of a Glover-West vertical retort bench, and the top strand feeds rice or seed into the overhead bunkers. The "coal" can be observed passing by gravity through the retorts, and drops after extraction into the lower strand of the conveyor, by which it is carried to "coke" storage bunkers, and there dumped. This model has only recently been returned from Poland, where it attracted a great deal of attention at the Polish National Exhibition at Poznan—the "Wembley" of Poland. Another exhibit at Castle Bromwich which also figured in the Polish National Exhibition is a fine coloured perspective view of the installation of Glover-West vertical retorts at Warsaw, so arranged that all parts of the plant can be examined in detail.

On the same stand the Derbyshire Silica Fire Brick Company, Ltd., at whose works at Friden, Derbyshire, the brickwork for Glover-West retort settings is produced, are exhibiting vertical and horizontal retort sections, and a variety of silica firebrick and insulating brick products.

West's Rotinoff Piling and Construction Company, Ltd., have a working model of their shell piling machinery which demonstrates the ingenuity and efficiency of this method of pile driving. They also exhibit photographs showing piling operations in connection with retort house and gasholder foundations, foundations for ropeway towers, &c.

William Whitehouse & Co., Ltd.,

Brueton Street, Birmingham.

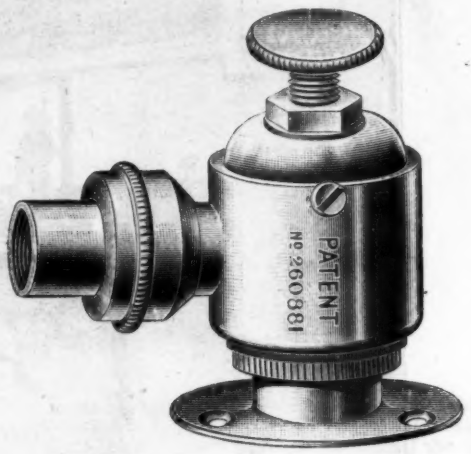
This Company indicate on their stand the versatility of a firm that has been manufacturing all kinds of brass goods for use in the gas industry for over fifty years. Their products are needed where the gas first enters the house, in the form of main cocks, made in many sizes. Modern requirements call for as large a fullway as possible, and ¾-in. and 1-in. cocks are shown with pieces of brass tube ¾ in. and 1 in. in diameter pushed right through to demonstrate the ample size of the gasway.

Other small gasfittings, joints, and cocks in a great variety of sizes call for the regular use of hundreds of different patterns, but particular reference should be made to the patent "House" valve for ensuring silent gas fires. The features of this speciallty are:

> Its scientific design for conveying to the fire the maximum amount of gas capable of being passed through the supply.
>
> Its silence in action.
>
> Its ensurance of the flame temperature at its maximum with the consequent elimination of waste heat.

This article is made on special machines in minimum quantities of 3000 at a time, and has been adopted as the standard article for its particular purpose by many gas companies. Brass cocks for gas cookers are made to customers' own patterns.

The firm has catered for every phase of the gas lighting industry from the early days of chandeliers, when "water-slide" pendants were a novelty, and the incandescent mantle a thing of the future. To-day they are exhibiting a range of modern lighting fittings, comprising brackets and pendants for every domestic need, and in harmony with the current taste. Fixtures are shown fitted with "Flamglow" glass panes, which give a soft warm golden light, free of all eyestrain, and



Patent "House" Valve.

"Moire" glass panes in beautiful tinted colours. As the name suggests, the appearance of the latter is similar to watered silk. A speciality that has just been patented is the "Whitehouse" three-hook collar, for attachment to ordinary half-inch stems of plain down rod pendants, enabling them to be converted readily (without the aid of a gasfitter) to bowl fittings or shade lights. A range of these fitments, with specially designed open bottom glass bowls, is prominently displayed.

White Tile Heaters, Ltd.,

York.

Exhibited on the Economic Gas Boiler Company's stand are Lambert water heaters. These heaters are of the instantaneous type. They are all-British production. All sections are made of stout gauge copper, tinned inside and out, and, being interchangeable, any section can be easily replaced. They are fitted with a patent interlocking device which ensures that the water cock must be opened before the gas is turned on. A special feature of their design is the removable condensation trough, and another feature is the simplicity with which the gas and water connections can be fitted at the right or left hand side of the heater, as desired.

The water passing through the heater never comes in contact with the gas, therefore the water can be used for all domestic purposes. All models occupy but little space, and have an attractive white tile appearance. There are no metallic surfaces to polish, as all gas and water fittings are chromettic plated. Laboratory tests, state the makers, prove that the efficiency of the heater is over 87 p.ct. when delivering water at a temperature rise of 64° Fahr. The smallest model consumes 40 c.ft. per hour, and the largest 130 c.ft. per hour.

Willey & Co., Ltd.,

Exeter.

Exhibits to everyone interested in gas supply are to be seen at the stand of Messrs. Willey & Co., Ltd., of Exeter. A very comprehensive display is made of high-capacity meters, and, these meters being open for inspection, every new development since the last Fair was held is displayed to view. These meters can be made by Willey & Co., Ltd.., to almost any capacity. As compared with "Lights" and "Standard" types, not only is there the advantage of increased capacities to cope with that extra consumption required, but the reduced overall size is a very great asset. This allows a meter to be fitted in the minimum of space. There are further points of great interest with these meters—*i.e.*, the patent flexible flanges, allowing easy mating and no distortion of the sides of the meter or valve plate. The automatic lubricating feed pump in the larger types allows the moving and bearing mechanism always to work easily without those stoppages due to dry seizure or irritating noises. The firm also demonstrate other items of their manufacture (they make almost everything for gas), and one

should not omit to see their ranges of main, union cocks, &c. The cocks of fullbore are of special note for the gas salesman.

The Vulcan Stove Co., Ltd., side of this firm are showing their latest types of gas cooker and fires. They claim their fires to be very efficient and silent.

Wilsons and Mathiesons, Ltd.,

Leeds.

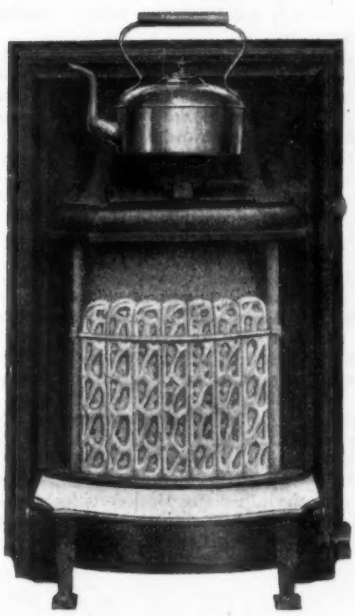
(Radiation Ltd., Proprietors.)

This firm are showing their "Emperor Sunbeam Interior" gas fire in satin brass finish. This finish is unique in its cap-

Wilson's "Emperor Sunbeam."

tivating effect, and is already becoming very much in demand. The "York" gas fire has the ever-useful boiling burner concealed in the canopy, which is hinged to form a perfectly secure boiling hob when opened. No difference from the ordinary gas fire canopy is noticed when this is closed up. It is shown in armour metal finish.

The Wilson "Circulator" is an ideal hot-water outfit for general use, substantially made and easily connected into the existing hot water flow and return system. The gas supply can be controlled with the Wilson thermostat if required. The "Circulator" cylinder is on the same principle, but has its own storage, so that it can be used to supplement an existing supply



Wilsons & Mathiesons "York" Fire with Concealable Boiling Ring in Canopy.

that is inadequate, or to supply a complete self-contained hot water system.

George Wilson (Gas Meters), Ltd.,

Coventry.

Progress is evidenced at the stand of this firm, where a range of all types of measurement appliances for the gas industry are exhibited. Principal among these, the "Certus" meter has achieved a marked popularity among leading gas organizations, owing to its special system of lubrication, whereby lubricants may be fed from outside without the necessity of dismantling or removing any part of the meter. Cases of "drying-up" and perishing of the diaphragm are obviated by means of the "Certus" oiling device, which is of a dual-valve type, in cases of certain types of gas of less oily nature than in general use. It is claimed that the "Certus" is a preventive of most diaphragm troubles, and thus ensures efficient and accurate meter service.

Of special interest are Messrs. Wilson's new type gas meter valves and diaphragms, which, judging from exhaustive experiments recently undertaken, may claim to maintain accuracy indefinitely. Meters with these new-process diaphragms are on

view, as also a special super high-capacity meter with exceptionally low absorption of pressure.

Among other types of measuring appliances being shown may be mentioned high-capacity meters; pressure gauges; test meters; recorders; hotel meters; meter cabinets; district pressure recorders, &c.

A special feature of Messrs. Wilson's exhibit is the inclusion of an entirely new type coke-burning open-hearth household grate, in which the combustion principle is claimed to be abnormally economical—yet exceptionally efficient. This stove embodies novel features, and should prove a valuable contribution to the cause of economical heating.

Woodall-Duckham Companies, Ltd.,

Allington House, Victoria Street, S.W. 1.

"Consult W-D on all carbonizing problems" has been a slogan of the Woodall-Duckham Company for the past few years. The stand sets out to show the various types of plant offered by the Company for use in the carbonizing industries.

The central exhibit consists of a very effective revolving stand showing a number of beautifully coloured diagrammatic drawings of Woodall-Duckham specialities, including continuous vertical retorts, intermittent vertical chambers, Becker coke ovens, circular tunnel kilns, Peale-Davis coal cleaning plants, "T.I.C." tar treatment plants. There are also shown two models, one illustrating the "W-D" intermittent vertical chamber, and the other the Becker coke oven—two recent developments introduced by the Woodall-Duckham Company into Great Britain, both of which have met with great success. For those who require more detailed information on any subject there are available a number of attractive brochures.

The extent of Woodall-Duckham work may be judged by the fact that of the types of plant illustrated on the stand, the Company have brought into operation during 1929 the following new plants; 13 continuous vertical retort plants; 3 intermittent vertical chamber plants; 2 coke oven plants; 1 refuse destructor plant; 1 circular tunnel kiln; 1 coal cleaning plant; and 4 tar treatment plants; representing a capital value of £1,500,000. All these plants were built of British materials by British labour.

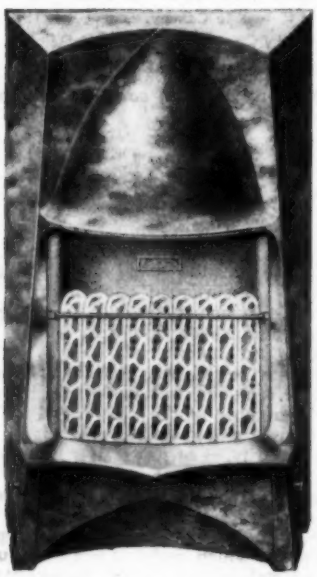
John Wright & Company,

Birmingham.

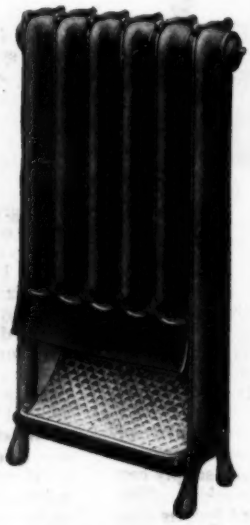
(Radiation Ltd., Proprietors.)

This Company's "Eureka New World" gas cooker is particularly noticeable. This cooker is entirely finished in

20-gallon "Sunhot" Boiler.



"Cresset" Fire, Pewter Finish.



"St. Bernard" Radiator.

"St. Vincent" Radiator.

"Rado" porcelain enamel, is cleaned as easily as a dinner-plate, and will keep its brilliant flint-like surface for a life-time of use. Here is shown, for the first time, a fine example of the "Cresset" gas fire, with dogs—a universally adaptable design, that has already become popular wherever gas is used for domestic heating. It is shown in a very beautiful pewter finish, an example combining delicacy with extreme endurance. Wright's "Sunhot" boiler is sure to attract a large share of attention. A far-reaching achievement in the scientific conservation of heat has been incorporated in this water-heating appliance, and the favourable gas consumption figures of the "Sunhot" (10 ft. maximum for heating up and then only 1½ c.ft. per hour to maintain 20 gallons of water at 140° Fahr.) speak for themselves.

Messrs. Wright's also show examples of their "St. Vincent" and "St. Martin" radiators (6-loop size) on the stand. All the gas fires that are exhibited on Radiation stand have the new "Beam" radiants, about which so much has been heard since their introduction in October, 1928. Visitors to the stand will have a unique opportunity of judging for themselves of the great step forward that has been made by the production of these radiants.

Gathered at the Fair.

It Pays to Advertise.

In these days of gigantic national advertising schemes, nothing is more fascinating than to see the way in which industries grow and flourish as a result of constant and scientific Press advertising—provided, of course, that good goods and sound service are behind the advertising.

An outstanding example of consistent co-operative advertising is that of the gas industry. Though a number of pro-

gressive individual undertakings made full use of Press advertising from the earliest days, it was not until 1912 that the industry got together and approached the public as a united force. The co-operative advertising of the gas industry, through the British Commercial Gas Association, was then started; and the fruits of this united effort are shown by the fact that the output of gas to-day is close on three-and-a-quarter thousand million c.ft. per annum. This is more than twice the output at the beginning of this century.

The actual figures make one's brain reel, as much as when one considers how many miles certain stars are distant from the earth. As these figures are such definite proof of the truth that "It pays to advertise," the literature stand of the British Commercial Gas Association at the Fair, showing the scope of the national Press campaigns, is interesting both to the general public and to the advertising expert.

* * * *

Making Our Roads Safe.

So appalling is the mortality from accidents caused by motor traffic, that the need for making our roads safer for both motorist and pedestrian becomes more and more urgent. Investigations prove that many accidents are caused at night by inadequate lighting. The efforts of the gas industry to improve conditions are manifest at the Fair, where numerous up-to-date lighting appliances are displayed. These new types of burners minimize the bugbear of all motorists—patches of alternating glare and gloom—and provide an even illumination comfortable for the man in the street and the drivers of passing vehicles.

* * * *

Use of British Tar Helps Our Basic Industries.

Nowadays nobody will buy a foreign product if he can get an equally good, and often better, British product. In this connection, the British Road Tar Association's stand at the Fair is of great interest to all those responsible for, or interested in, the treatment of our roads. Here is presented a comprehensive survey of the use of tar for road making, which includes samples of road tar, aggregates used in the construction of roads, and sections taken from experimental roads. The Association's tar viscosity demonstration apparatus is also shown.

The two vital considerations to-day in the making of roads are, first, that the roads should be able to withstand the ever-increasing volume of motor traffic; and, secondly, the preservation of public safety. The use of British tar can best provide for these two factors.

A great point is that the extension of the use of British tar will assist both the coal industry and the carbonization industry; for tar is the product of the carbonization of coal by the gas industry and the coke oven industry. In a time of industrial depression, this economic advantage is a factor worthy of thought.

* * * *

The Sun's Heat in the Home.

One of the most interesting features of the Gas Industries Section is a display of the new radiants for gas fires—the clay "wiggly-woggly" things in front of the fire!

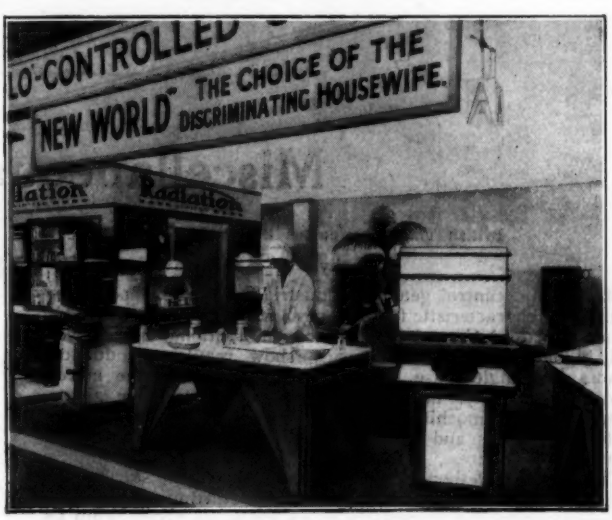
These new radiants are a wonderful invention, and are so composed and constructed that they give a heat more akin to the sun's heat than the old gas fires. Some people used to complain of the scorching effect of a gas fire; but they will have no cause for that if they replace their old radiants by these new ones, which, incidentally, cost no more. The heat is more gentle, though not a whit less effective, and they heat-up very quickly. Moreover, we get more of the healthful infra-red rays.

We already have artificial sunlight; now we have artificial sunheat, too!

* * * *

Save Cost of One House in Thirty.

To save the cost of building one house in every thirty erected seems almost a dream in these days of expensive house building. But it can be done. In the building of the popular house of five or six rooms, great economies are effected owing to the



fact that gas fires do not require such large flues as coal fires, because the volume of the products of combustion is less. Deep chimney breasts are therefore unnecessary, and may be entirely dispensed with if adequate ventilation flues are provided. This, of course, considerably increases the area of the room and floor space. With the constant increase in the use of gas fires, and the decline of the dirt-creating coal fire, we may possibly see also a decrease in the cost of houses.

To Whom Credit is Due for the Gas Section.

NATIONAL COMMITTEE.

This Section is organized under the auspices of a National Committee, fully representative of the various organizations in the industry. The members of this National Committee are as follows:

Representing the—	
SOCIETY OF BRITISH GAS INDUSTRIES. . .	Mr. Charles S. Bennett Mr. Cyril G. Davis Mr. E. J. Davison Mr. D. M. Gibb Mr. A. W. Glover Mr. F. J. Gould Mr. R. B. Hodgson Dr. E. W. Smith Mr. H. M. Thornton Mr. F. C. Tilley Mr. Frank West
NATIONAL GAS COUNCIL	Mr. W. J. Sandeman Mr. L. E. Clift
INSTITUTION OF GAS ENGINEERS	Mr. C. S. Shapley Mr. W. E. Price
BRITISH COMMERCIAL GAS ASSOCIATION . .	Mr. F. W. Goodenough Mr. Hubert Pooley

Mr. R. J. MILBOURNE is Chairman of the National Committee.
Mr. A. W. SMITH is Vice-Chairman of the National Committee.
Mr. R. J. ROGERS is Hon. Secretary of the National Committee.

LOCAL ORGANIZING COMMITTEE.

A Local Organizing Committee to co-operate with exhibitors in the Section has also been formed, consisting of the following members:

Mr. R. J. MILBOURNE .	Messrs. C. & W. Walker, Ltd., Donnington, near Wellington, Shropshire.
Mr. A. W. SMITH . . .	General Manager and Secretary, Gas Department, Birmingham.
Mr. R. B. HODGSON . .	The Whessoe Foundry and Engineering Company, Ltd., Darlington.
Mr. C. S. BENNETT . .	Messrs. Gibbons Bros., Ltd., Dudley.
Mr. CYRIL G. DAVIS . .	The Davis Gas Stove Company, Ltd., 60, Oxford Street, London, W. 1.
Mr. D. M. GIBB . . .	The Parkinson Stove Company, Stechford, Birmingham.
Mr. F. J. GOULD . . .	The Bland Light Syndicate, 25, Grosvenor Place, London, S.W. 1.
Mr. H. POOLEY . . .	Engineer and Manager, Gas Department, Leicester.
Dr. E. W. SMITH . . .	The Woodall-Duckham Companies, Allington House, Victoria Street, London, S.W. 1.
Mr. J. F. DAVIES . . .	Essex Works, Aston, Birmingham.
Mr. R. TALBOT CLAYTON	Messrs. Cannon Iron Foundries, Ltd., Deepfields, near Bilston.
Mr. C. A. GOODALL . .	Messrs. Goodall, Clayton, & Co., Ltd., Hunslet, Leeds.
Mr. WALTER BARROW .	President (Birmingham Chamber of Commerce, 95, New Street, Birmingham).
Mr. E. W. BACHE. . .	Chairman (Fair Management Committee, British Industries Fair, Chamber of Commerce, Birmingham).
Mr. C. ELLIOTT . . .	General Manager (British Industries Fair, Chamber of Commerce, New Street, Birmingham).
Mr. H. EYLES	Secretary (Birmingham Chamber of Commerce, 95, New Street, Birmingham).
Mr. R. J. ROGERS . . .	Hon. Secretary (Gas Industries Section, Gas Department, Birmingham).

Gas Section Slogans.

The roof banners over the Gas Section read as follows:

Over 100,000 men are employed in the gas industry.

The use of gas has more than doubled since 1900.

Ninety p.ct. of the population cook by gas.

Gas is used in nine million homes and factories in Great Britain.

Gas light is nearest to daylight.

Gas is fuel on tap—instantly available.

If it's heat you want, it's gas you want.

Gas improves conditions for industrial workers.

Modern industry uses gas.

Gas lowers production costs.

Gas ensures high quality work.

Gas means perfect heat control.

Gas will solve the Nation's Smoke Problem.

Gas is used in over 3000 industrial processes.

Use gas—the modern fuel.

Gas for efficiency with economy.

How Gas Helps.

Some idea of how largely gas enters into all industrial work and the general life of the community can be gleaned from the following facts relating to the Fair:

200 gas cookers, roasters, vegetable boilers, and other canteen equipment, have been installed.

* * * *

Over 100 separate meters have been installed for exhibiting firms, some of whom will take as much as 1500 c.ft. of gas per hour.

* * * *

When on normal full load, the consumption of gas at the Fair will be 40,000 c.ft. per hour.

Miscellaneous Exhibits.

British Thomson-Houston Co., Ltd.,

Rugby.

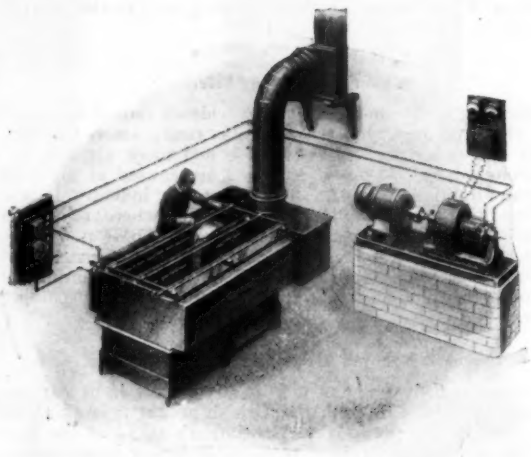
Motors and control gear for industrial use are in operation, so that the characteristic features of each may be demonstrated. In addition to A.C. and D.C. motors of fractional horsepower and higher rating, the Company show repulsion induction motors for single-phase A.C. circuits, as well as the newer worm-geared motor units and "built-in" motors for giving direct drive to machine tools and woodworking machinery. Motor generators and "Fabroil" silent pinions occupy positions of prominence.

The "B.T.H." thermal type oil-immersed motor starter and circuit breaker, developed for the direct starting of squirrel-cage motors taking current up to 30 amps. on voltages up to 660 are seen in operation. This starter measures only 8¾ in. high by 7⅛ in. deep by 6 in. wide.

W. Canning & Co., Ltd.,

Great Hampton Street, Birmingham.

A great advance has taken place during the past year in the perfecting and extension of chrome-plating. In the Canning organization research keeps pace with production, with



Canning Chromium Plating Equipment in Operation.

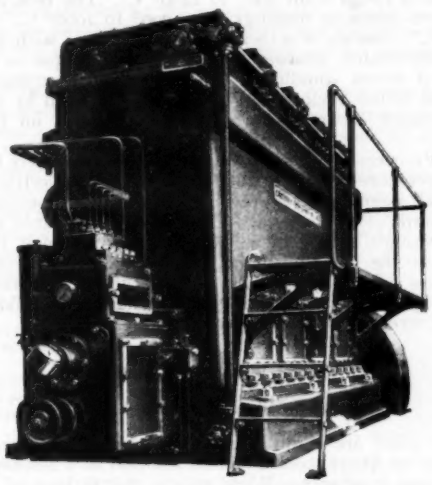
the twin results that success in the operation of the process is now a certainty and the number of plant installations during the year have been almost doubled.

Another point of great importance to those contemplating installations is that all hazard has been eliminated from the operation of the plant—there is no danger in working a "Canning" installation.

Crossley Bros., Ltd.,

Openshaw, Manchester.

Messrs. Crossley Brothers have this year concentrated on their new vertical compressorless diesel engine. They show two examples, one type RVD4, representing a 4-cylinder engine with a normal rating of 220 B.H.P. at 350 R.P.M. This is the first demonstration of a Crossley diesel engine of this size at any exhibition. It is shown in running operation, and is suitable for power transmission by belt or ropes, or for direct coupling to an electric generator.



New Type Crossley Diesel Engine.

The second example, also shown as a running exhibit, consists of a 3-cylinder vertical Crossley diesel engine, type OVD3, which has a normal rating of 82 B.H.P. at 450 R.P.M. It is complete with extension shaft and belt pulley for an industrial drive. These two engines have cylinders of 27½ and 55 B.H.P. capacity respectively, and are built as engines having 1, 2, 3, 4, 5, or 6 cylinders. Suitable compressed air starting equipment is provided, consisting of direct coupled petrol engine and compressor with M.S. receiver, also shown on the stand.

An outstanding feature due to the robust design of this new oil engine is the freedom from vibration.

Expanded Metal Company, Ltd.,

Burwood House, Caxton Street, Westminster, S.W. 1.

This firm are demonstrating the "Servarising" treatment of metal articles to protect them from oxidation (scaling) at high temperatures. The process is suitable for heat treatment appliances, oil engine parts, furnace fittings, oil burner nozzles, tools for roasting furnaces, preheater tubes, &c.

General Electric Co., Ltd.,

Magnet House, Kingsway, W.C.

The "G.E.C." have an exhibit which includes actual working demonstrations of the application of electric heat to various industrial processes. The stand is divided into three sections. The centre section takes the form of a lounge, and both the end sections are assigned to electric furnaces in operation.

Gledhill Brook Time Recorders, Ltd.,

Huddersfield.

A complete and interesting display of time recording and cost checking devices is made by this firm. The Gledhill Brook "Clipper" recorder is a good example of a modern time recorder. This machine, observe the manufacturers, makes no mistakes, knows no favouritism, and causes no friction. It is a card machine which the worker operates on "arrival" and "departure." Every manufacturing process or operation can be timed in the same simple manner, and various systems of checking and costing can be combined with this one machine.

The firm also market other models for simple time checking of workmen, or clerical staff, also for registering time on dockets, waybills, cost cards, &c.

All Gledhill Brook models print the exact minute, hour, and day, and distinguish between A.M. and P.M. time.

Hailwood & Ackroyd, Ltd.,

Morley, near Leeds.

This firm are as usual exhibiting a great variety of attractive glassware for all kinds of lighting fittings. There are many novel designs in the new forms of artistic lighting ware and fittings, which are entirely British, having been manufactured throughout at the firm's Morley Works.

A speciality is made of commercial signs, of which many designs are made up. The colours in such instances are burnt into the glass, the lettering and design being permanent, and washable.

G. A. Harvey & Co. (London), Ltd.,

Woolwich Road, London, S.E. 7.

The exhibits shown by G. A. Harvey & Co. (London), Ltd., will especially attract the engineer and those entrusted with the efficient management of plant and equipment in all manner of industrial and municipal undertakings. Of particular interest is the array of perforated metals and woven wire in a wide variety of patterns and metals. The selections on view will give some idea of the innumerable industrial purposes served by these two kinds of metalwork. They are extensively used for the screening, grading, cleaning, sifting, separating, or filtering of a vast number of commodities from coal, coke, ore, stone, and gravel to sugar, fruit juices, and fine chemicals.

Steel furniture and equipment for offices, works, factories, and warehouses forms another part of Messrs. Harvey & Co.'s exhibit. Their productions in this direction include vertical filing cabinets, cupboards, shelving, storage bins and racks, clothes lockers, wardrobes, tables, stationery cabinets, transfer cases and boxes, card index cabinets, letter trays, and waste-paper tubs.

A large part of the output at the Harvey Works consists of steel plate work and constructional work, and among the many diverse forms of industrial equipment they produce are storage vessels, stills, condensers, cylinders, &c., for ammonia recovery, benzole, chemical, and creosoting plants, water softening plant,

A CROSSLEY GAS ENGINE OF 85 B.H.P.

en route to the Mills of Messrs. J. H. Vavasseur and Co., Ltd., Kurunegala, Ceylon.

storage tanks up to 116 ft. diameter, hydraulic pressings, tar still bottoms, angle section rings, vulcanizing pans, bunkers, and structural steel work of all kinds.

Stewarts & Lloyds, Ltd.,

41, Oswald Street, Glasgow.

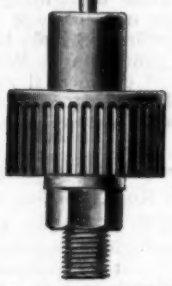
While this firm are not exhibiting in the special Gas Section of the Fair, they are showing a comprehensive selection of manufactures in the General Engineering Section, No. 2, included in which will be found many items of interest to gas engineers. Among these may be instanced a set of ⅛ in. to 1½ in. genuine puddled wrought-iron tubes, together with samples of wrought-iron strip, all to the specifications of the Institution of Gas Engineers. In addition, there is a set of steam tubes ranging from ¼ in. to 6 in. bore and of all standard 1½ in. fittings, both black and galvanized. Samples of steel tubes with spigot and socket joints for lead and yarn of both ordinary and long sleeve patterns, and with short and long sleeve welded joints, are exhibited with the joints sectioned to show their construction.

In addition, there is a large exhibit of tubes and fittings with "Victaulic" joints, supplemented by working models which clearly demonstrate the many advantages of this joint.

Trier Bros., Ltd.,

36, Victoria Street, S.W. 1.

This firm are showing a complete range of samples of their "Stauffer's" lubricant—the subject of a registered trade mark,



"Tell-Tale" Lubricator.

and made solely, since 1882, by themselves. There is also a comprehensive range of samples of other types of greases in the following main categories: Motor and cup greases, sponge greases, yarn greases, ball and roller bearing greases, and solidified oil (tunnel blocks).

A display of the complete series of "Stauffer" and other type lubricators of their own manufacture is to be seen. These lubricators are almost too well-known to need a description, but a note might be made of a new model of the "Tell-Tale" lubricator. This is entirely made of steel or gunmetal pressings, and is therefore light and strong. Also exhibited is a set of the different sizes of the firm's "split-grip" collar.

Viozone, Ltd.,

88-90, Chancery Lane, W.C. 2.

This firm are showing the precision pyrometer "Pyroversum II." This is an improvement on the present "Pyroversum I.," which has a range from 500° to 1400° C. The new improvement covers accurate readings from 900° to 2000° C. "Pyroversum II." consists of a calibrated metal frame with a shaded glass in the centre, graduated from reddish opaque to a dense opaque. A worm spindle for fine adjustment, extended from end to end at the back of the frame, and operated by a thumb screw, ensures accurate and steady readings of all temperatures.

The "Pyroversum" is a useful instrument not only for ordinary temperature readings, but for checking up electrical pyrometers and ascertaining correct temperatures of pouring metal at the mouth of the cupola. The furnace or heated metal is sighted through a hole in a slide piece, by pushing the slide gradually to the right until the glow of the furnace or heated metal is no more visible. The reading of the temperature is indicated by the scale on the left-hand side of the slide piece. This new invention is being shown for the first time.

Charles Winn & Co., Ltd.,

Granville Street, Birmingham.

On this stand are Winn screwing machines, tube cutting-off machines, and fitters' tools; and in addition to a display of fire extinguishing appliances, Winn valves and fittings of various descriptions are on view. Much interest attaches to their back-pressure gas valves for use with air blast in industrial and other gas-heated apparatus.

Development of Submerged Combustion.

By C. FEATHERSTONE HAMMOND.

[From a Paper before the Institute of Fuel, Feb. 12—Dr. F. A. Freeth, O.B.E., F.R.S., in the Chair.]

What is fundamentally wrong with ordinary combustion practice is that the fuel and air are never properly mixed, and, once having initiated conditions so antagonistic to mixing, the complete chemical combination of the combustible components is impossible. The first study, therefore, is to find a means to avoid segregation or "stratification" of the air and fuel, as the author terms imperfect mixing.

This is accomplished in the Hammond system by first providing a supply of fuel and the whole of the necessary air in the chemically correct proportions, and, secondly, introducing these into a mixing appliance constructed of laminations with a special form of piercing, so that when these are built together and secured by rivets, the large and medium sized holes form tubes from which ducts lead the gas and air into the mixing chamber, formed by the large centre hole. Here the gas and air emerge in the form of jets, and the cross-sectional area of the passages are such that these streams or jets are of approximately equal velocity, and have, therefore, no superior kinetic energy in either the gas or the air streams. These streams readily diffuse into one another in the mixing chamber to form a perfect homogeneous mixture of uniform composition, and with this perfect mixture it is found that the rate of the one-stage rapid combustion achieved in the combustion chamber of a Hammond burner is 200 times that obtained in the combustion chamber of a high-duty boiler under forced draught. In the standard Hammond burner utilizing town gas for fuel, the heat release per cubic foot of combustion chamber space is of the order of 20 million B.Th.U. per hour.

In approaching the problem of burning a fuel in direct contact with water, this perfection of combustion was found to be the first necessary step. The flame generated in this way is so stable as to be unquenchable.

The production of such a flame and the existence of such an intense flame zone brought its own peculiar difficulties in the design and manufacture of a combustion element which would meet all the requirements, and which would at the same time be durable. Perfect combustion conditions require:

(*a*) Perfect diffusion of the fuel in the complete air for combustion.

(*b*) Complete protection against lighting back or backward propagation of the flame from the combustion zone into the mixing zone.

(*c*) The presence in the combustion zone of a visibly hot surface to act as catalyst in raising the reaction rate of combustion, for, under conditions of visible temperature, most bodies have the property of acting as catalyst to the chemical reactions of combustion, and the flame propagation rate is increased from 100 times and upwards according to fuel analysis and other factors.

The essentials to meet these conditions are:

(*d*) A mechanism or structure which will bring about the conditions postulated in (*a*) capable of translation into a form suitable for pulverized, gaseous, or atomized fuel.

(*e*) A transfer passage with means to keep its temperature down in spite of its proximity to an intensely hot combustion zone, and thereby to maintain security against backward flame propagation.

(*f*) A combustion chamber lining of suitable heat-resisting material, which shall not be subjected to undue strains under the conditions in which it has to be continuously operated, and which is provided with a safeguard against overheating and fusion.

(*g*) Means for ignition for starting up.

All of these are embodied in the Hammond system.

In a Hammond combustion unit (submerged type arranged for gaseous fuel), the patented mixing chamber is at the burner head, to which the complete air for combustion and the fuel

gas are fed. The body of the burner encloses a tubular combustion chamber terminating in a nozzle, and connecting the mixing head with the combustion chamber is a transfer passage designed to ensure a mixture velocity in excess of the backward propagation rate of the flame at any throughput down to the minimum for which the burner is rated.

This rate of flame propagation has a range which is measured under conditions providing a cold or black contact surface between the combustible mixture and the walls of the containing vessel; and for coal gas of an average composition this rate may be taken to be about 3·3 ft. per second. Any velocity given to the combustible mixture which is in excess of this rate will, therefore, give security against lighting back, provided the surroundings are well below visible temperature.

The transfer passage walls are actively cooled to prevent their approach to visible temperature. Without this provision they would become heated to redness by conduction inch by inch until the flame had crept back into the mixing head.

In this type of Hammond burner the cooling of the transfer passage wall is effected by the incoming air. Water jacketing of the transfer passage is utilized where the situation necessitates it, as, for instance, in the type designed for metallurgical work.

The combustion chamber lining, which in this case is alundum, is required to operate continuously year in and year out at temperatures varying between 700° C. and 1500° C. and upward.

The order of temperature in the combustion chamber, lined with alundum, cannot fall far short of the maximum realizable with the fuel supplied. Calculated on the usual basis of the net calorific value, using the specific heats of Partington and Shilling (extrapolated where necessary), with no allowance for direct radiation, these maximum temperatures are:

			°C.
Gas Light and Coke Company's	500	C.V. gas	2145
South Metropolitan	560	,, ,,	2140
Glasgow	470	,, ,,	2160
Manchester	450	,, ,,	2125
Recovery producer gas	180	,, ,,	1850
Non-recovery producer gas	140	,, ,,	1775
Fuel oil	19,450	B.Th.U. per lb.	2185

As an indication of the durability of this lining, it may be noted that one of the first alundum-lined burners assembled four years ago is still running with the original lining unimpaired, upwards of 3000 burning hours being recorded. This is rendered possible by a combination of factors which are designed to permit of removal of heat from the refractory lining at an increasing rate as the temperature of the refractory wall rises to its maximum working temperature. Mechanical stresses in the burner are avoided by spring-loading all the joints, so that the whole is under a constant elastic load at all temperatures.

The Hammond submerged burner or combustion unit is made in seven sizes, representing nominal ratings ranging from 30,000 B.Th.U. to 1,000,000 B.Th.U. per hour.

One of the chief advantages which the author claims for submerged combustion is that the area required for the establishment of complete temperature equilibrium is provided by the flame itself, by the manner in which the combustion gases are dispersed within the substance being heated.

Visualized as an area such as would be presented by the containing wall of (say) 1 c.ft. of gas, the area for heat transfer would appear small—being, in fact, 6 sq. ft.—but when the behaviour of the flame is observed it is seen to split up into minute gas bubbles, most of which disappear into solution in the surrounding liquid, only to reappear at the surface in much the same way as the gases at the surface of a tumbler of aerated water. The order of dimension of gas in solution is μ, and therefore it is reasonable to assume that the mean size of these gas bubbles is of the order of 0·001 in. cube, and 1 c.ft. so divided up results in a total area of contact of 1·65 acres approximately. In this factor, then, lies the immense economy of space for a given output, for such areas of boiler plate or of fire or water tube in ordinary heating practice, or such areas of metal-pot wall in heating non-ferrous metals, are impossible; we get, in fact, only within one-thousandth part of such areas in orthodox practice.

Air Lift Circulation.

This aeration of the liquid in the immediate vicinity of the flame is of the greatest consequence, since it may be made use of, and the manner of its use is to provide the aeration of a column of the liquid in such a way as to cause its upward displacement by the heavier column of unaerated liquid from a portion of the body of the liquid being heated which is separated from the zone of aeration. This circulation is intensified and controlled by surrounding the burner with a chamber having an inlet for the heavier liquid and an outlet for the rising aerated liquid, and this may take the form of an open-ended cylinder of larger diameter than the burner and surrounding the flame zone. This, then, constitutes an air lift, well known as a means of deep well pumping where compressed air is the medium for aerating the ascending column;

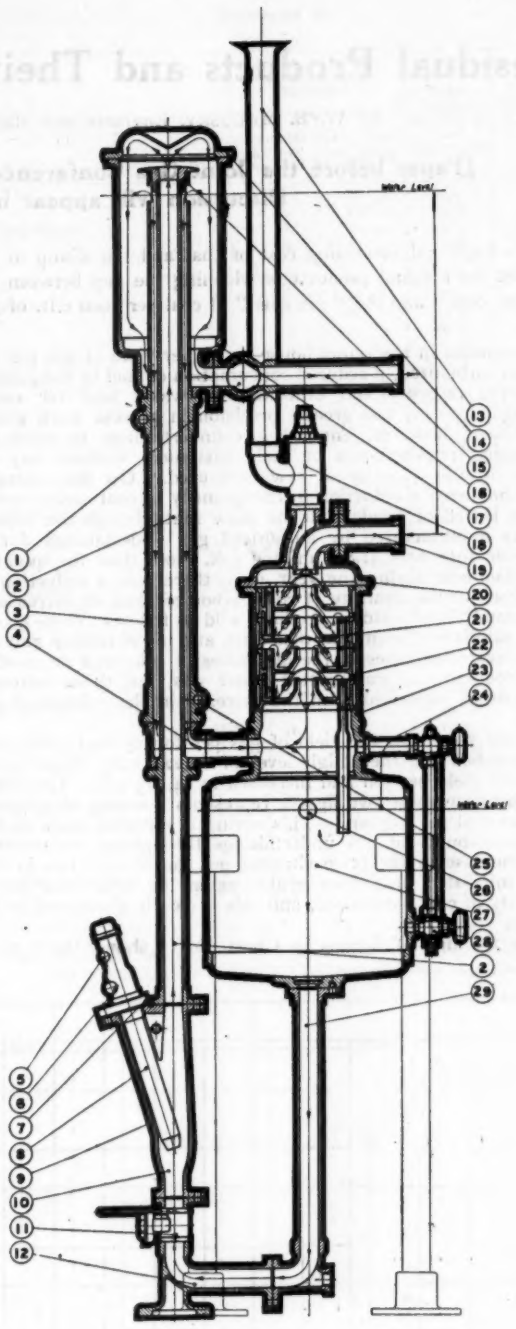


Fig. 1.

the fundamental difference being that here the products of combustion are used, and the combination of aeration and heat tend still further to intensify the circulation.

The Circulator Unit.

In the application of the Hammond burner a system utilizing a circulator chamber and embodying the air-lift principle has been developed as being most readily applicable to existing tanks, pans, or vats, for rapidly heating up the whole body of the liquid. These units are easily fitted at two connecting flanges. Where this circulator is required to function as a pump for creating a substantial head of the hot water or other liquid, a somewhat modified design enables this to be done with high efficiency. This is seen in a practical application in the Hammond central heating unit (illustrated in section in fig. 1), in which (8) is the burner, (10) the circulator chamber or air-lift foot-piece, (27) is the expansion tank in which the water level is shown, (2) is the rising main surmounted by a head tank (17). This head tank is maintained full of hot water by the action of the burner in heating and aerating the column of water in the rising main (2). From this tank the hot water flows by gravity by the outlet (16), and by the superior head thus provided the hot water displaces the cold water through the radiator system.

(To be continued.)

Residual Products and Their Effect Upon the Price of Gas.

By W. B. McLUSKY, Engineer and Manager to the Halifax Corporation Gas Department.

[Paper before the Joint Gas Conference, Birmingham, Feb. 20, 1930. A Report of the Discussion will appear in the "JOURNAL" next week.]

The high and increasing cost of coal and the slump in the market for residual products is widening the gap between the "gross cost" and the "net cost" of coal per 1000 c.ft. of gas sold.

Economies in the retort house—a higher yield of gas per ton of coal carbonized, a reduced consumption of fuel in the generators, the recovery and utilization of waste heat for steam raising purposes, and greater precision in process work generally—have, however, enabled gas undertakings to meet the increasing requirements of their customers without any increase in the quantity of raw coal used. On the contrary, there has been a reduction in the quantity of coal carbonized.

The Board of Trade Returns show that, though the volume of gas manufactured by authorized gas undertakings during the year 1928 was 41,851 million c.ft. more than the quantity manufactured during the year 1920, there was a reduction of 4000 tons in the quantity of coal carbonized and an increase in the quantities of residual products sold as follows: Coke 90,000 tons, sulphate of ammonia 1800 tons, and tar 26 million gallons. There were increases in the quantities of coke and oil used in the production of carburetted water gas, but these increases were small compared with the increase in the volume of gas made.

In the year 1920 the yield of gas per ton of coal carbonized had reached the then high level of 12,222 c.ft. Eight years later the yield per ton had increased to 14,225 c.ft. The difference between these two figures represents a saving of 2,879,000 tons of coal per annum! This saving is reflected more or less in the accounts of gas undertakings throughout the country. The increase in the price charged per ton of coal has in fact been mitigated to a considerable extent by reductions in the quantity of coal carbonized, and this is clearly illustrated in the charts.

The top line of figures in Chart No. 3 shows the "gross cost" of coal per 1000 c.ft. of gas sold, and the second line the "net cost." In works well situated for the purchase of coal and the disposal of residual products the "net cost" to-day is actually below the pre-war level.

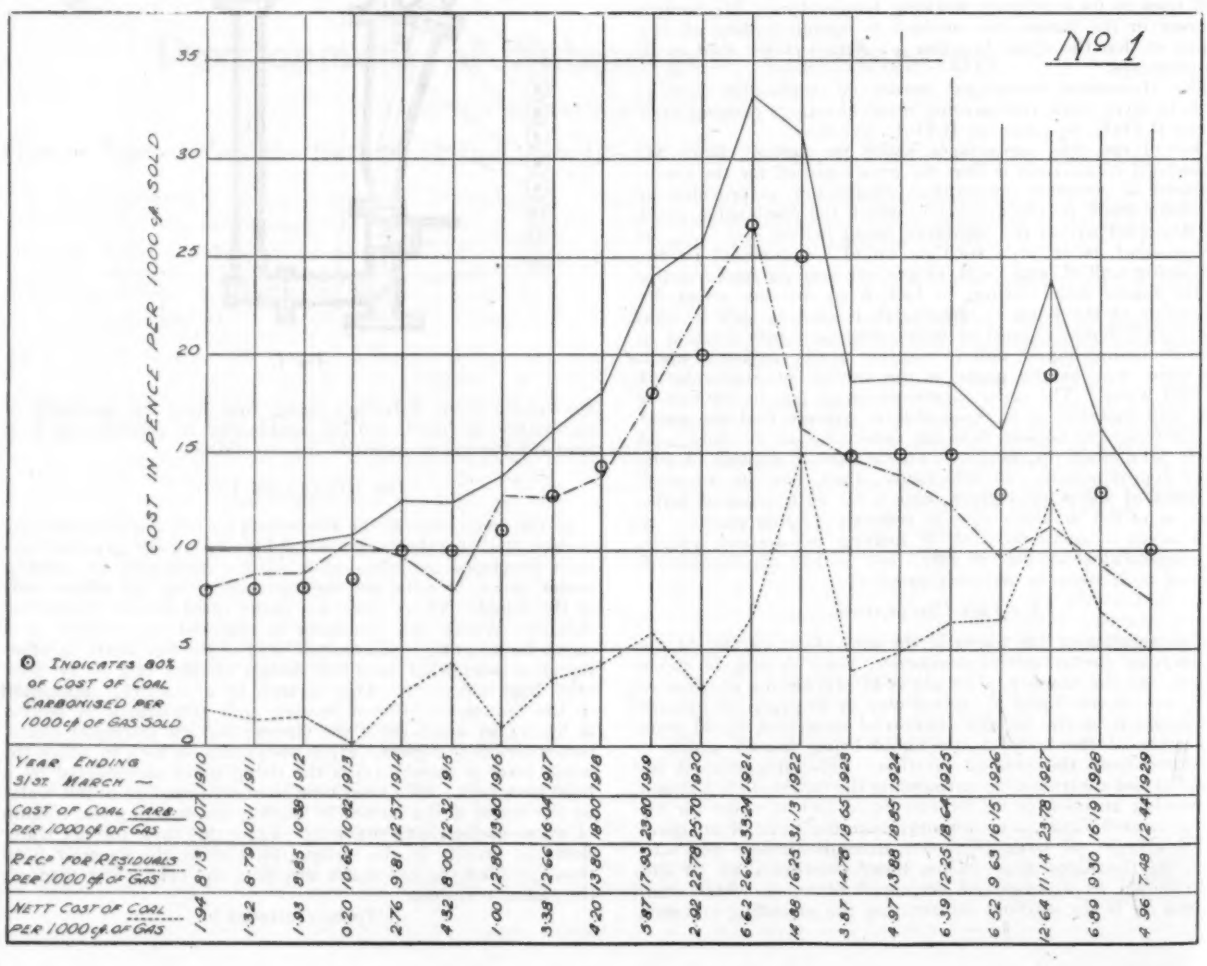
Chart No. 1 shows the progress made in a typical Yorkshire undertaking. While the Yorkshire undertakings have the best coal in the country within easy reach, they are, for that very reason, faced with competition—competition with the best house coal; competition with coke imported from non-statutory carbonizing works in their neighbourhood; and strong competition with imported materials for road making and dressing.

At the beginning of the period (1910) and until the end of the year 1923 the receipts from residual products, as Chart No. 1 shows, amounted to 80 p.ct. of the cost of coal, but in recent years, as the result of the competition referred to, it is no longer possible to maintain this high level, and the gap is widening between the "gross cost" and the "net cost" of coal.

At the beginning of the period the gross cost of coal was 10·07d. per 1000 c.ft. of gas sold; at the end of the period 12·44d. At the beginning of the period the net cost of coal less residual products was 1·94d.; at the end of the period 4·96d.

Chart No. 4 shows the actual prices paid per ton of coal used, and the prices realized per ton of residual products sold in the same undertaking. The top dotted line shows the cost of coal, including unloading and storage; the second line the price of the coal itself; the third line the net receipts from residual products; and the three remaining lines the prices realized for each of the residual products without any deduction for working expenses.

Until the year 1921 (see Chart No. 2) the receipts from residual products were more than sufficient to meet the whole of the expenditure in a West Yorkshire undertaking for items other than coal—were, indeed, sufficient to meet the whole of the cost of labour and materials required for repairs and maintenance in the works and on the district—but since the year



1921 the receipts from residual products have not been sufficient for this purpose.

For five years before the war the receipts from residual products exceeded the expenditure on manufacture and distribution to the extent of 1·86d. per 1000 c.ft. of gas sold, but during the past five years the expenditure on manufacture and distribution has exceeded the receipts from residual products by 7·03d. per 1000 c.ft. of gas sold.

In the year 1910—referring again to Chart No. 2—coal cost 8s. 10d. per ton; at the close of the last financial year coal cost 18s. 6d. per ton—an increase of 109 p.ct.—but the figure for repairs and maintenance (works and distribution), which was 6·76d. in 1910, was 15·26d. in 1929—an increase of 125 p.ct.

Only peace in the industry, harmonious working, and higher efficiency could have made it possible to supply our customers with gas at prices little more than 50 p.ct. above the pre-war level—and in several cases at much less than that—in face of such increases in the prices of the things we have to buy.

Statement A shows that a large production of coke per ton of coal carbonized is not always accompanied by a high price per ton of coke sold, but in a number of gas undertakings the higher yields of coke have justified the process, for the receipts for coke per 1000 c.ft. of gas sold are among the highest. In one case particularly—where the quality of gas supplied is maintained at a high level—the increase in the net cost of coal less residuals per 1000 c.ft. of gas sold is only 1·64d. above pre-war level.

The lower figures for coke sold per ton of coal carbonized are generally accompanied by extraordinary increases in the production of gaseous therms per ton.

Statement B shows the receipts for tar, which, in spite of low prices, are remarkably good in one or two cases. The yield of tar is improving, especially where the coal is carbonized in continuous vertical retorts.

Statement C shows the receipts from ammonia. This statement includes only a number of examples of the best returns from this source. The prices realized are remarkably good at a time when so many undertakings have a deficit on the ammonia account. The recovery of ammonia from coal in the process of gas-making is beginning to approach the level predicted by William Young. The analysis of accounts reveal yields of 37 lbs. of sulphate of ammonia per ton of coal carbonized, and higher figures than this have been obtained.

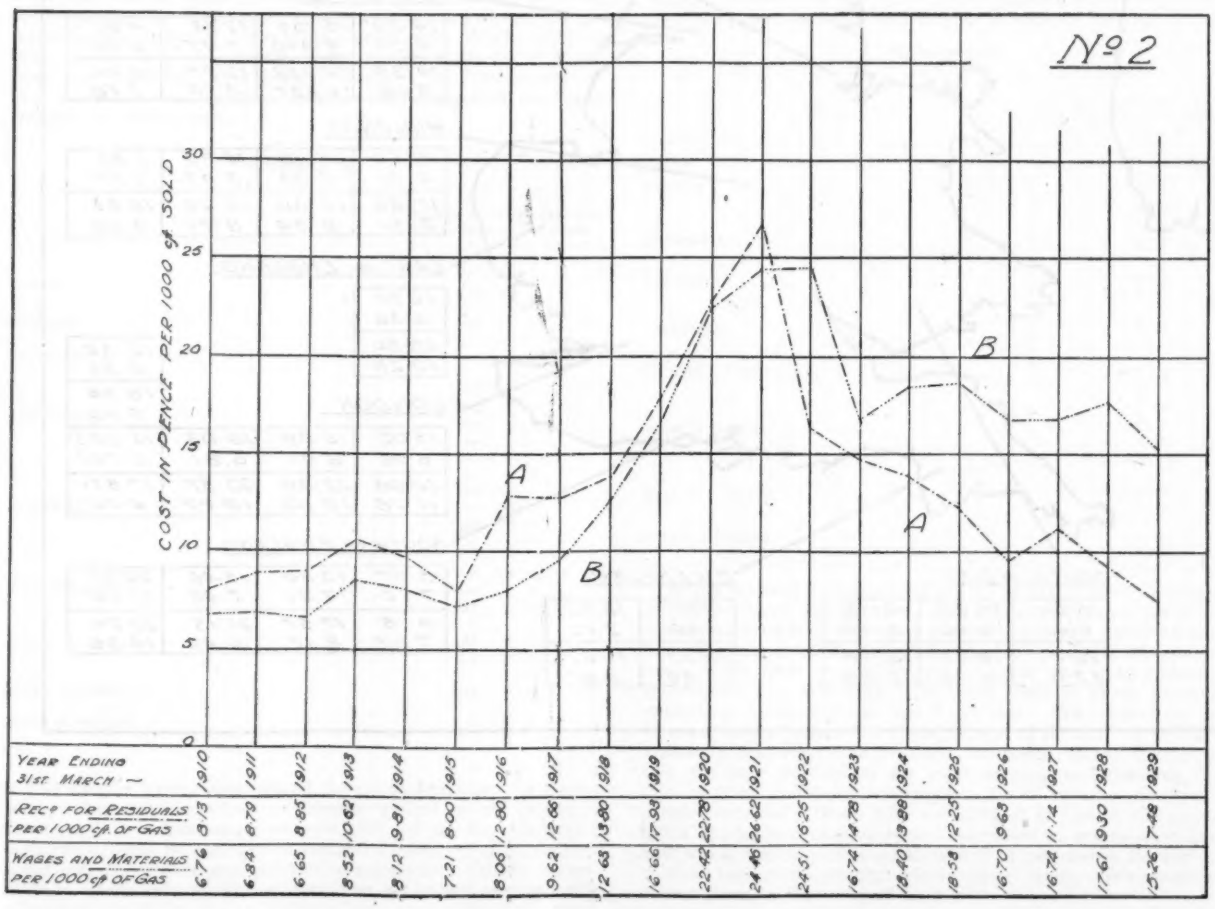
NOTE.—All the figures in Statements A, B, and C have been extracted from the "Gas World" Analysis of Accounts—Corporations to March 31, Companies to Dec. 31, 1928.

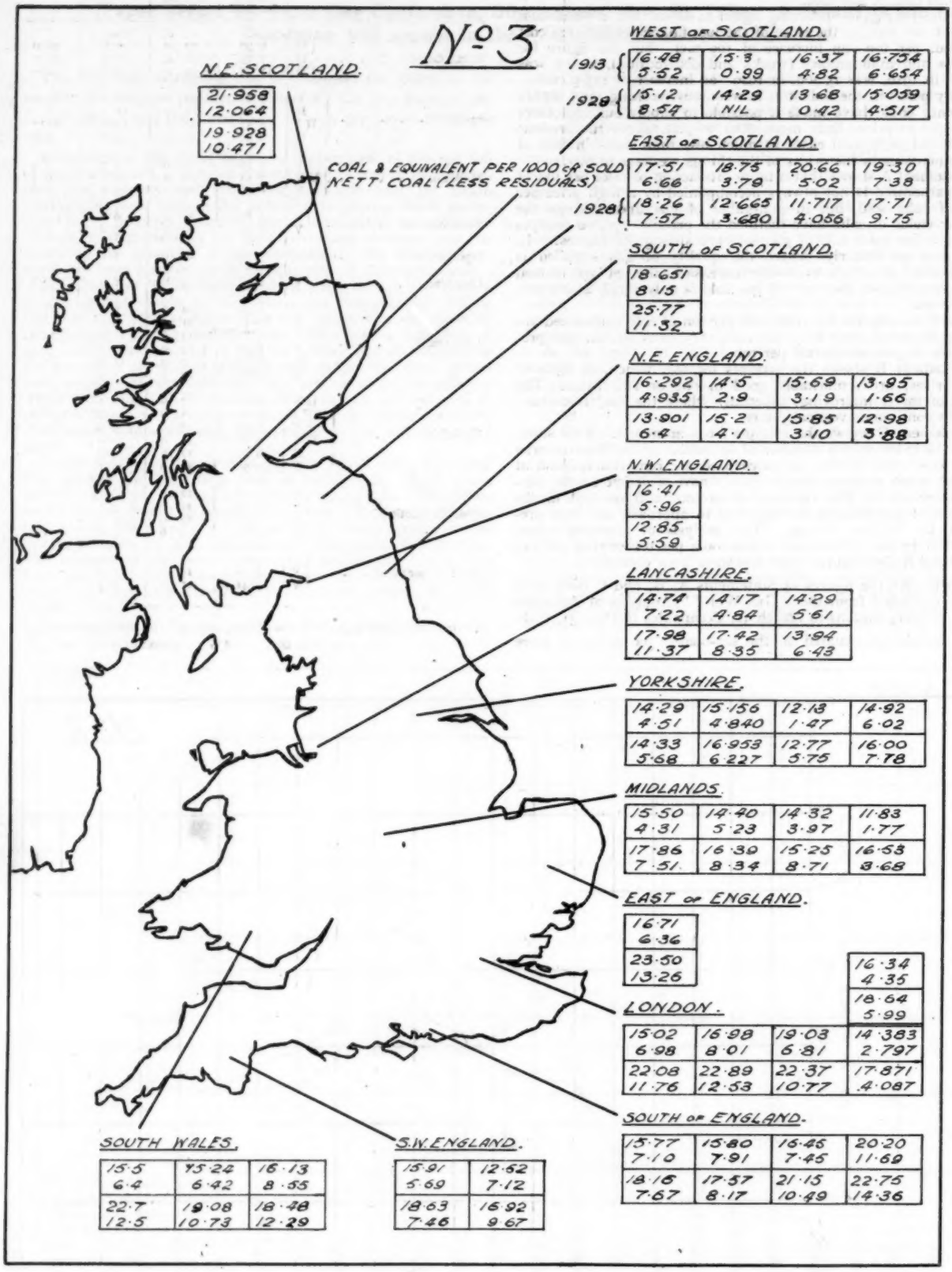
Undertakings situated on the sea-board, 300 miles or more

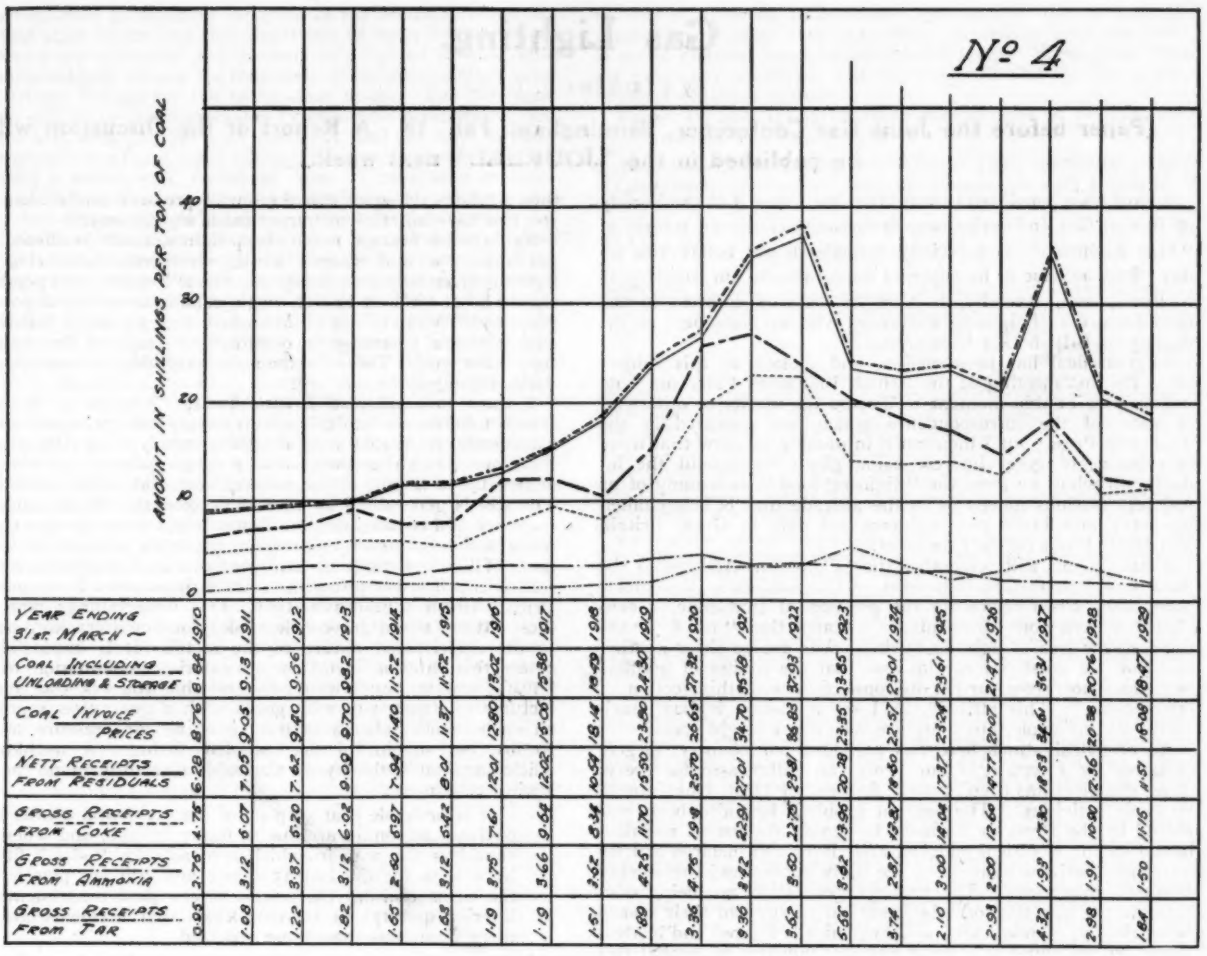
Statement A.

District.		Average Price Received. Per 1000 C.Ft. of Gas Sold.	Average Price Received. Per Ton of Coke Sold.	Coke Saleable per Ton of Coal Carbonized	Percentage of C.W.G. Made.
		d.	s. d.	Cwt.	
South Coast	H	6·39	23 0	9·6	36·0
	H	7·85	20 0	12·4	28·7
	H	11·05	39 0	9·6	34·0
London	H V	7·29	24 0	8·8	25·9
	H	8·18	16 0	11·1	..
	H I	8·31	20 0	10·9	22·5
	H	8·52	15 0	14·8	9·7
Midlands	V	5·28	17 6	8·7	3·9
	H V	7·01	20 9	9·1	6·4
	H V	8·06	19 0	9·6	2·0
Staffordshire	V	5·80	22 6	6·8	..
	V	6·50	27 0	9·2	3·6
Derbyshire	H	6·24	19 0	9·8	CO
Cheshire	V	2·50	15 0	6·5	4·8
Lancashire	V	4·37	14 0	9·6	2·7
	V	3·11	21 0	4·5	..
	H V	4·84	15 6	11·5	35·0
	H V	6·30	17 0	9·7	7·4
	H	9·77	17 0	12·2	5·0
	H	10·78	17 6	11·9	..
Yorkshire	H V	4·46	17 6	10·4	CO
	H V I	5·29	15 0	9·7	8·0
	V	5·48	18 0	7·7	15·0
	H V	6·97	15 0	10·0	..
	H	8·02	17 6	11·0	..
	H	10·70	22 0	10·1	..
West of Scotland	V	4·38	12 0	9·1	3·5
	V	6·70	22 0	7·1	..
	V	7·10	23 0	7·0	..
	V	9·23	19 6	9·6	..
East of Scotland	V	3·67	21 0	5·0	..
	V	4·66	19 0	6·2	..
	V	7·41	17 6	9·3	..

H = Horizontal Retorts. I = Inclined Retorts. V = Vertical Retorts.
CO = Some Coke Oven Gas. CWG = Carburetted Water Gas.




No 3
COAL & EQUIVALENT PER 1000 cft SOLD
NETT COAL (LESS RESIDUALS)
N.E. SCOTLAND.
21·958
12·064
19·928
10·471
WEST of SCOTLAND.
1913
16·48 | 15·3 | 16·37 | 16·754
5·52 | 0·99 | 4·82 | 6·654
1928
15·12 | 14·29 | 13·68 | 15·059
8·54 | NIL | 0·42 | 4·517
EAST of SCOTLAND.
17·51 | 18·75 | 20·66 | 19·30
6·66 | 3·79 | 5·02 | 7·38
1928
18·26 | 12·665 | 11·717 | 17·71
7·57 | 3·680 | 4·056 | 9·75
SOUTH of SCOTLAND.
18·651
8·15
25·77
11·32
N.E. ENGLAND.
16·292 | 14·5 | 15·69 | 13·95
4·935 | 2·9 | 3·19 | 1·66
13·901 | 15·2 | 15·85 | 12·98
6·4 | 4·1 | 3·10 | 3·88
N.W. ENGLAND.
16·41
5·96
12·85
5·59
LANCASHIRE.
14·74 | 14·17 | 14·29
7·22 | 4·84 | 5·61
17·98 | 17·42 | 13·94
11·37 | 8·35 | 6·43
YORKSHIRE.
14·29 | 15·156 | 12·13 | 14·92
4·51 | 4·840 | 1·47 | 6·02
14·33 | 16·953 | 12·77 | 16·00
5·68 | 6·227 | 3·75 | 7·78
MIDLANDS.
15·50 | 14·40 | 14·32 | 11·83
4·31 | 5·23 | 3·97 | 1·77
17·86 | 16·30 | 15·25 | 16·53
7·51 | 8·34 | 8·71 | 8·68
EAST of ENGLAND.
16·71
6·36
23·50
13·26
16·34
4·35
18·64
5·99
LONDON.
15·02 | 16·98 | 19·03 | 14·383
6·98 | 8·01 | 6·81 | 2·797
22·08 | 22·89 | 22·37 | 17·871
11·76 | 12·53 | 10·77 | 4·087
SOUTH of ENGLAND.
15·77 | 15·80 | 16·45 | 20·20
7·10 | 7·91 | 7·45 | 11·69
18·16 | 17·57 | 21·15 | 22·75
7·67 | 8·17 | 10·49 | 14·36
SOUTH WALES.
15·5 | 15·24 | 16·13
6·4 | 6·42 | 8·55
22·7 | 19·08 | 18·48
12·5 | 10·73 | 12·29
S.W. ENGLAND.
15·91 | 12·62
5·69 | 7·12
18·63 | 16·92
7·46 | 9·67



from the nearest colliery, cannot hope to dispose of all their products inland. The export trade must always absorb a considerable proportion of the residuals produced. Works situated near the centre of the country—many of which are far removed from the coalfields—have greater facilities for the disposal of their products, though they lack the advantages of moderate freights or railway rates.

Statement B.

District.	Average Price Received per 1000 Gallons of Tar Made.
	£ s. d.
London	18 16 0
	19 18 0
Midlands	27 13 0
Staffordshire	22 7 0
Lancashire	13 7 0
	19 3 0
	20 0 0
	21 5 0
Yorkshire	14 0 0
	14 18 0
	15 10 0
	20 10 0
	33 14 0
West of Scotland	16 10 0
	22 5 0
	27 7 0
East of Scotland	16 0 0
	17 0 0
South of Ireland	23 8 0
North of Ireland	33 7 0

The smaller towns have solved the process-problem for themselves; they have adopted continuous vertical retorts in many cases, and it is interesting to note that, of all the gas-works carbonizing coal in continuous vertical retorts, 76 p.ct. receive a net income of over 20s. per ton of coke sold. Of the undertakings which rely wholly or partly on horizontal retorts, only 43 p.ct. receive 20s. per ton. These figures, of course, refer to average prices received, and they date back to the year 1928.

Statement C.

District.	Average Price Received per Ton of Sulphate of Ammonia (or Equivalent) Made.
	£ s. d.
London	2 15 5
	3 12 4
	6 4 7
Midlands	3 4 5
Lancashire	3 4 2
	3 4 7
Yorkshire	4 8 9
	8 0 0
Eastern Counties	3 6 9
West of Scotland	3 8 4
	3 17 4
	4 1 5
	5 11 7
East of Scotland	2 19 6
	4 8 7
South of Ireland	5 0 7

While waiting and working for a revival in trade, a country which produced, twenty years ago, more residual products from the carbonization of coal than any other country, cannot hope to have the whole of its output of residual products absorbed at home. We shall recover the export trade; we shall endeavour to increase it. We must also—and there is great room for expansion here—increase the local sale. We should be able to sell a larger proportion of our output of tar and tar products, ammonia and ammonia products, at home; many municipalities use only British tar for road making and dressing, and this number could be increased. An increasing number of people—especially those who are obliged to live in the smoke-laden atmosphere of towns—are interested in smoke abatement and would use a good smokeless fuel in preference to raw coal if that fuel was brought within their reach. We must not expect them to "come and fetch it."

Gas Lighting.

By FREDERICK J. GOULD.

[Paper before the Joint Gas Conference, Birmingham, Feb. 18. A Report of the Discussion will be published in the "JOURNAL" next week.]

I have been permitted to state that the Council of the Society of British Gas Industries very deliberately chose the subject of "Gas Lighting" as especially suitable to put before you to-day; first, because of its supreme importance to our industry as a whole, and, secondly, because of its vital interest to the manufacturers of lighting apparatus who are members of the Society of British Gas Industries.

A great deal has been written and spoken on this subject since the last meeting at the British Industries Fair, and I do not propose at this moment to discuss the merits or otherwise of some of the correspondence which has appeared in the Technical Press; but I mention it in passing to show that there is evidence of great interest being given throughout the industry to what we term the "lighting load," and many of us are very anxious indeed as to the attitude that is being taken by many prominent gas engineers not only in Great Britain and Ireland, but on the Continent.

Some of you will remember that I gave an Address to the Society of British Gas Industries on this subject in November, 1926, and, when reviewing the position at that time, I concluded with a note of warning. I stated that "much of the unnecessary loss of lighting business was due to sheer apathy, and that we must pay special care that the canker of indifference does not grow further in connection with this section of our service." This attitude, as I see it to-day, is very much worse on the whole, but there are very many bright spots.

An electrical atmosphere has pervaded our country, largely produced by a section of our Press; an enthusiasm for everything electrical has been created, fostered by H.M. Government by their activities. The servant problem has also been employed by the Press as a means to exploit the use of so-called labour-saving electrical gadgets, and clever and inspired articles have been written in most of the daily papers and the weekly women's magazines. The younger generation are being educated to the idea that only by electrical energy can their homes be efficiently, economically, and hygienically lighted and heated. What are we doing as a great national industry to combat this fallacy? Publicity can only be met by publicity. Can we afford, when advertising gas in the National Press, to allow these statements with regard to electricity (many of them untrue) to go unchallenged? Some of you here to-day have, in your own districts, taken up this challenge and organized a defensive policy in a just attempt to hold what is left of your lighting load.

DOMESTIC LIGHTING.

It is generally accepted that, to give an efficient lighting service and retain it, a maintenance system should be in force. Some undertakings find it necessary to give free maintenance (there is, of course, no free service), but this is a costly matter, and not always possible or desirable. It is calculated that an outlay of 4d. per burner per visit for cleaning ordinary domestic burners barely covers the cost, inclusive of wages and materials; but the sacrifice (say) of half this amount is well worth while. The deficit can largely be wiped out by sales—a fair profit can be obtained on the sales of lighting accessories. You have the electricity undertakings in various districts competing, with free or assisted wiring schemes and instalment purchase terms of payment, for your service to slot consumers; and it is imperative that a well planned maintenance scheme be in existence providing for periodical attention to all burners—not less than nine visits per annum, certainly every month during the winter—to enable you to retain the lighting. Avoid cheap and noisy burners! It is necessary to instal a good and properly designed burner that will withstand ordinary pressure fluctuations. Gas lighting is constantly being discredited because of noise and poor light. Even the best burner has its limitations. Cleaned and adjusted during the day at a pressure, shall we say, of 30 tenths, it comes into operation later when the conditions are perhaps entirely different. The variations of pressure and make may be considerable; and while some well designed burners adapt themselves to variations up to 20 tenths, there must, of necessity, be a certain reduction in duty. In addition to this, you have the constant variations in specific gravity.

Gas lighting is often discredited because of poor results in certain districts. Consequently, until you have equal distribution of pressure and make, the manufacturers' task is a difficult one.

There are some who strongly advocate the use of a burner with a fixed ejector standardized and marked to suit the conditions of any given area. In June, 1918, there was some correspondence in the Technical Press on this subject, and the answer to the question raised at that time is the same to-day as then: "Give us equal distribution of pressure and make, and you can have an efficient burner made in this way."

Again, with fittings, much cheap light material is offered and purchased for maintenance work, which can only bring gas lighting ultimately into disrepute. Your brackets and pendants should be of the best British virgin solid-drawn tube of not less than 19 S.W.G. (0·040). Manufacturers in the "S.B.G.I." adopt decimal markings in defining the gauge of the material they offer you. There is then no confusion in speaking of various gauges.

I want to emphasize *British Tube*. A quantity of solid-drawn tube comes into this country every year produced on the Continent, and is sold to us at approximately 1d. per lb. cheaper than our British product; also a large quantity of old condenser tubes is put on the market and sold at the best offer. The size is generally ⅜ by 18 S.W.G. (0·048). These tubes are re-drawn and reduced to ½ in. diameter of various gauges (specimens and sections of these re-drawn tubes I have here with me). These are made up into pendants and brackets, and are sold at much lower prices than are fittings made from genuine British virgin solid-drawn tube. Gas undertakings who buy these fittings run a grave risk—risk of seasonal cracking owing to the deteriorated nature of the metal. It is impossible to detect this inferior metal by an exterior examination of the finished article, and I would suggest that you ask your manufacturer to supply you with goods with a guarantee impressed on each article, also a guarantee of an air pressure test of 10 lbs. per sq. in. of the complete fitting. A well-known official and an authority on the subject recently made the following statement:

> It is probable that 50 p.ct. of the accidental deaths from coal gas poisoning are due to faulty fittings, and when one considers the way in which contracts for "slot" fittings have been for the last 25 years, and still are placed with the firms quoting the lowest prices (and consequently of inferior quality), it is remarkable that accidents are not more numerous than those reported.

Let me tell you what sort of test our British product in solid-drawn tube will stand. The following figures are given by the Government Industrial Research Laboratory:

(*a*) A length of 0·040 tube ½ in. diameter tested for tensile strength gave a load of 2·65 tons = 45·9 tons per sq. in.

(*b*) A complete 1-light pendant well designed with ball joint, lever cock, and nosepiece, tube 0·032 (all fittings produced from rodding) properly threaded, submitted to a vertical test broke at the thread connecting the tube to the ball joint at 2420 lbs. (22 cwt.).

There is a prejudice in some quarters against the use of fittings made from rodding, and the following tensile tests made with material from both rodding and casting, from which cocks, ball joints, &c., are produced, will be of interest:

(*c*) Tensile test with extruded rodding was 23·4 tons per sq. in.

(*d*) Tensile test with brass casting was 10·36 tons per sq. in.

Apart from the quality of your fitting, the design and standardization of the fitting and its working parts are important. A standard form of construction should be adopted, type of joint, and position of plugs and niting. Half niting should always be used; plugs with quarter niting are liable to be misunderstood by your consumers, and there is the danger of the cock being left at the "on" position. If sufficient care is not taken in the selection of fittings, the undertaking is involved in high maintenance costs. It is always cheapest in the end to purchase the best article. If you analyze your labour costs for attending to leaky fittings, you will find them considerable. The sending of a fitter merely to tighten a screw of a badly constructed fitting costs 2s. to 2s. 6d., and in addition you have the risk of constant danger to your slot consumer, and no doubt he is a very important person and takes a fair proportion of your total load. In one large city 27 p.ct. of the total output produced by the gas undertaking goes to the slot consumer, and the largest proportion is for lighting.

Attach to your fittings scientifically made burners of the diffuser type for preference, to help to mitigate the discoloration difficulty, but do *not* attach an opal or flint balloon. Instead, use a neat, fancy shade, in either decorative glass or parchment. Give consumers the same opportunity of decorative lighting effects as provided by electricity undertakings. So many gas installations are dowdy and uninteresting in appearance!

One hears so much of late about the limitations of gas lighting. The six-roomed house is so often mentioned as the largest type in which it is considered that gas can be expected to be used for this purpose. I fear that many of us living in London

get accustomed to thinking in terms of the Metropolitan area, and lose sight of the fact that thousands of large houses in the Provinces are efficiently and economically lighted by gas; and gas undertakings should see that their showrooms contain suitable artistic fittings for the better-class house. The old types of two and three arm suspension fittings have disappeared, for use not only with gas, but with electricity, and you have in their place artistic bowl and panel fittings, fitted with cluster burners diffusing a warm, soft, beneficial light. I have been in well-appointed showrooms in which are displayed gas cookers and fires; but domestic lighting fittings are conspicuous only by their absence, the inference being that the particular undertaking is not interested in gas lighting, and assumes that its consumers are not. We cannot afford to ignore it, but there is a tendency on the part of some to lose interest. They say, "Let the lighting go; it is a small load; I am increasing my cooking and heating!" But they are wrong! The introduction of electric lighting into a home is the "thin end of the wedge." Radiators, toasters, kettles, and ovens follow; and the cooking and heating loads are attacked. So many gas undertakings are waking up to this fact. Sales managers are being appointed by large undertakings; special lighting campaigns are organized; house to house canvassing; inspection of all lighting fittings; condemnation of old, replacement by new and efficient fixtures and burners. Only by these intensive campaigns can you retain this side of your business.

The advantages of using gas as an illuminant are so well known that I will not repeat them in greater detail than is necessary. Its use as a ventilating and sterilizing agent; and its comfort to the sight. Here I would remind you of the great danger that arises from brilliant unshaded sources of light placed in the direct line of vision. The human eye cannot, without discomfort, endure a greater brilliancy in the source of light which is entering it, either directly or indirectly, than about 5 C.P. per sq. in. of lighting source—namely, about the intrinsic brilliancy of an Argand burner or an oil lamp. The inverted incandescent gas mantle has a brilliancy of 40 C.P. per sq. in. of source, and, therefore, needs a diffusing globe of about eight times its area to give a perfect light. Other values are given in Table I.

TABLE I.—*Brightness or Intrinsic Brilliancy of Sources of Light.*

Source.	C.P. per Sq. In.	
Sun	800,000	(A. P. Trotter)*
Searchlight, modern	400,000	,,
Electric arc, naked	20,000	(J. Darch)†
Tungsten electric arc ("Point-o'-Lite")	12,900	(Dr. Thomas and D. Chandler)‡
Tungsten electric filament gasfilled lamp	5,250	(A. P. Trotter)
Flame arc	5,000	,,
Nernst (zirconium electric filament) lamp	3,000	(Dr. L. Bell)§
Tungsten electric filament vacuum lamp	1,100	(Dr. Thomas and D. Chandler)
Carbon electric filament lamp	400 (average)	,,
Gas-mantle, high-pressure, inverted	250	,,
Acetylene flame	60	(A. P. Trotter)
Gas-mantle, low-pressure, inverted	40	(Dr. Thomas and D. Chandler)
Gas-mantle, low-pressure, upright	23	(A. P. Trotter)
Frosted tungsten electric filament vacuum lamp	10	,,
Argand gas flame	7·5	(Dr. Thomas and D. Chandler)
Petroleum lamp flame	4 to 9	(A. P. Trotter)
Batswing gas flame‖	3 to 4	,,
Candle flame	2·5	,,
Sky (average brightness)	2·5	(Dr. Thomas and D. Chandler)
Moon	2·0	,,

*Taken from "Illuminating Engineering."
†Taken from "Trans. Roy. San. Inst.." Vol. XXXI., No. 10.
‡Taken from "Illumination by Gas"—one of the World Power Conference Papers read in July, 1924.
§Taken from "The Art of Illumination."
‖NOTE.—Presumably when burning 16-C.P. gas under the old illuminating power standard.

You will note that the tungsten electric filament vacuum lamp has a brilliancy of 1100 C.P. per sq. in. The rays of light emanating from an incandescent gas mantle contain a larger percentage of green rays than those proceeding from any form of metal filament incandescent electric lamp. These green rays are extremely beneficial, and the mechanism of the eye is particularly sensitive to them.

Tables II. and III. give colour comparisons of various artificial illuminants with daylight.

TABLE II.—*Extracts from Dr. Nichols' Table containing Colour Comparisons of Various Artificial Illuminants with Daylight.*

Colour and Wave-Length.	ILLUMINANT.						
	Daylight (White Sky).	Oil Flame.	Acetylene Flame.	Incandescent Gas Mantle (Low Pressure).	Electric Arc (Plain Carbons).	Electric Incandescent Vacuum Lamps.	
						Tungsten Filament	Carbon Filament
Red, 65μ	1·00	1·84	1·38	1·22*	1·15	1·30	1·38
Green, 55μ	1·00	0·70	0·78	0·97*	0·91	0·80	0·77
Blue, 45μ	1·00	0·25	0·45	0·70*	0·60	0·42	0·40

*"Old (1894) mantle." A "new (1908) mantle" gave different values—viz., 1·16, 0·84, and 0·45 for red, green, and blue, respectively.
μ = one millionth of a centimetre. Some people use the micro-millimetre—*i.e.*, one millionth of a millimetre; and the wave-lengths are then written (for example) 650 μμ.
N.B.—While the experiments of Nichols, as presented by Gaster and Dow in their oft-referred-to work, make available a complete comparison of colour intensities throughout the spectra of various illuminants, there are here given only the relative strengths of three colours (those which are respectively nearest to the three primary colour sensations of the eye), since these measurements are sufficient to enable us—without separately measuring the intensities of all the colours along the spectrum—to infer the composition of the light which proceeds from any source yielding a continuous spectrum.

These properties, together with the comparatively generous area of its radiating source of relatively low intrinsic brilliancy, gives us a source which we justly claim as unsurpassed in quality; and, to quote Mr. W. A. Bishop: "We judge of the quality of an illuminant by its wave length characteristics. The resultant composite effect of these radiations, as evidenced by its colour, and by its softness or degree of diffusion as manifested by its order of intrinsic brilliance;" and we therefore claim that gas is the best artificial illuminant for the sight.

But, as I have been reminded recently by a well-known authority, these advantages do not carry us very far to-day in this electrical atmosphere to which I have referred, when gas lighting is considered old-fashioned; and, again, our commercial basis is not as sound as it was formerly. Gas lighting has always been quoted in recent years as being cheaper than electric light, but the old flat-rate basis of 6d. per unit for comparison with gas at 9d. per therm no longer obtains in some districts.

TABLE IV.

Table showing the number of units of electricity that require to be dissipated to provide equal lighting service* to that which one therm of gas will render:

Gas Utilized By:	Electricity Utilized By:	
	(1) Ordinary Metallic Filament Lamps.	(2) "Gasfilled" Lamps.
(*a*) Ordinary modern incandescent burners	5·37	2·83
(*b*) Superheated incandescent cluster-burners (No. 2 mantles)	8·00	4·22
(*c*) High-pressure incandescent burners	12·12	6·40

*NOTE.—Equal lighting service means equal candle-power maintained in both cases for the same period.

Assuming that it requires 2·83 units of electricity to equal the lighting service produced by 1 therm of gas (see Table IV., for which I am indebted to Mr. Bishop), and, for the comparison, we calculate gas at 9·2d. per therm and electricity at 2·5d. per unit, and take an ordinary well designed burner giving a duty of 80 mean hemispherical candle power = an efficiency of 25 B.Th.U. per candle-power hour (see Table V.), we shall require, approximately to equal the same mean hemispherical candle power as the burner, two 32-watt gasfilled spiral fila-

TABLE III.—*Extracts from Dr. Voege's Table Containing Colour Comparisons of Artificial Illuminants with Daylight.*

Colour.	Daylight.			Electric Incandescent Light.		Electric Arc Light Plain Carbons.	Incandescent Gas Light.	Acetylene Flame.	Oil Flame "Reform" Burner.
	White Sky.	Blue Sky.	Sunlight.	Carbon Filament Lamp.	Tungsten Filament Lamp.				
Red	1·00	0·77	0·90	1·76	1·63	1·35	1·20	1·37	2·18
Green	1·00	1·33	0·85	0·79	0·86	0·97	0·89	0·86	0·74
Blue	1·00	1·65	0·65	0·20	0·23	0·75	0·23	0·27	0·12

N.B.—As in the case of Table II. only the three colours which are respectively nearest to the three primary colour sensations of the eye have been taken from Dr. Voege's table for inclusion here.

TABLE V.

Type of Burner (Unscreened Sources).	A. B.Th.U. per Candlepower-Hour.			B. Candlepower-Hours per Therm.		
	Mean Horizontal C.P. Rating (I_h).	Mean Spherical C.P. Rating (I_o).	Mean Hemispherical C.P. Rating ($I\cup$).	Mean Horizontal C.P. Rating (I_h).	Mean Spherical C.P. Rating (I_o).	Mean Hemispherical C.P. Rating ($I\cup$).
No. 1.—"C" upright	34	45	..	2940	2220	..
No. 2.—No. 4 "Kern" upright	29	38	..	3450	2630	..
No. 3.—Ordinary inverted—large, medium, and bijou sizes	..	..	25	..	..	4000
No. 4.—Twin (No. 1 mantle) preheated inverted	..	..	19	..	..	5260
No. 5.—Four, five, and six (No. 2 mantle) preheated cluster inverted	..	..	16	..	..	6250
No. 6.—High-pressure inverted (80 in. w.g.—gas pressure system)	..	..	10·5	..	..	9520

ment lamps having an efficiency of 0·7 watt per candle-power hour. Taking as another basis of comparison 1000 candle-power hours, there is required for this service 0·25 therm in the form of gaseous energy, and 0·7 unit of electric energy. This shows gas costing the consumer 1·84d., as against 1·75d. for electricity.

You have many towns in which "all-in" tariffs are in force with electric energy costing half this figure. Let us take one example in the Midlands with a population of 30,000 composed largely of working-class people. The Urban District Council Electricity Department have an "all-in" scheme applicable to small private houses of six rooms in which the Council wire for the installation, and an inclusive standing charge is made of £1 14s. per annum *plus* 1d. per unit *less* 5 p.ct. rebate off current only.

On a consumption of 2000 units per annum, the standing charge of £1 14s. = ½d. per unit *plus* 1d. for current = 1½d. per unit
On 1000 units = ½d. + 1d. ,, ,, = 1½d. ,,
On 500 ,, = ½d. + 1d. ,, ,, = 1½d. ,,

There are also two-part tariffs for private houses and shops; a standing charge proportionate to rateable value *plus* all units at heating rate (1d. per unit or less). No doubt many gas undertakings have already put into practice a two-part tariff scheme to meet this competition; and I may mention it as worthy of consideration. I could give other examples where the standing charge is about the same figure or slightly higher, and the current is charged at 0·5d. per unit. This is serious competition. Calculated on the same basis, you would require to supply gas at 2·8d. per therm to meet it. The costs and rates vary very much all over the country, and there are one or two points to consider in this connection. One often finds that electrical equipment is not of the best material; wiring, switches, holders, flex, &c., are often of the poorest, because of cost consideration, and after (say) ten years, the cost of maintenance will probably be very heavy. We hear very little about the depreciation of light and the falling-off of the initial candle-power of electric sources. I have good authority for stating that the diminution in light output after 500 hours is from 10 to 20 p.ct.; the cost of lamp renewals is quite an item, and should be included when calculating the cost of electricity, especially for small working-class houses. In this connection we must not overlook the fact that, when gas is installed for lighting in this class of property, the warmth generated by incandescent burners has a very definite value.

May I suggest here that the newer and better types of domestic burners should be used to replace the ordinary universal, especially where you have such keen competition for your lighting? I referred to a duty of 80 M.H.S.C.P. Why not give 160 M.H.S.C.P. at the expenditure of another cubic foot of gas per hour? In Table VI. you have a statement of compara-

TABLE VI.—*Statement of Comparative Costs of Manufacturing Light by Different Methods.*

Method of Manufacturing Light.	Weight or Volume of Material, No. of B.Th.U. and Quantity of Electric Energy Required per Candlepower-Hour (Approx.).	Cost. Pence per Candlepower-Hour (Approx.). (*a*)	Pence per 1000-Candle-power-Hours (Approx.). (*b*)	Candlepower-Hours Purchased for 1s. (Approx.). (*c*)
By (1) candle (ordinary commercial type)	0·017143 lb. (horizontal rating)	0·085715	85·715	140
,, (2) oil—				
(*a*) Domestic wick lamp	0·00119 gall. ,, ,,	0·01666	16·66	720
(*b*) ,, incandescent mantle lamp*	0·000216 ,, ,, ,,	0·003024	3·024	3,960
,, (3) town gas—				
(*a*) open flame burner	0·4 c.ft.†	0·01200	12·00	1,000
(*b*) low-pressure upright incandescent burner	45 B.Th.U. (m.s.c.p. rating)	0·00360	3·60	3,333
,, inverted ,, ,,	34 ,, (horizontal ,,)	0·00272	2·72	4,412
,, ,, ,, pre-heated cluster-burner	25 ,, (m.h.c.p. ,,)	0·00200	2·00	6,000
high-pressure (80-in. W.G.) inverted incandescent pre-heated burner	16 ,, (,, ,,)	0·00128	1·28	9,375
,, (4) acetylene—	10·5 ,, (,, ,,)	0·00084	0·84	14,286
(*a*) open-flame burner	0·025 c.ft. C_2H_2; or 0·0055 lb. CaC_2 (horizontal rating)	0·01100	11·00	1,080
(*b*) inverted incandescent burner	0·010 c.ft. C_2H_2; or 0·0022 lb. CaC_2 (horizontal rating)	0·00440	4·40	2,700
,, (5) petrol-air gas used in inverted incandescent burner	0·000128 gall. (m.h.c.p. rating)	0·002176	2·176	5,506
,, (6) electric energy—				
(*a*) carbon filament lamp (low efficiency, 800 hours' life type)	4·05 watts (m.h.c.p. rating) equivalent to 13·85 B.Th.U.	0·02025	20·25	592
(*b*) ,, ,, ,, (high efficiency, 400 hours' life type)	3·52 watts (m.h.c.p. rating) equivalent to 12·04 B.Th.U.	0·01760	17·60	682
(*c*) metal filament lamp (vacuum type)	1·25 watts (m.h.c.p. rating) equivalent to 4·27 B.Th.U.	0·00625	6·25	1,920
(*d*) ,, ,, ,, (gasfilled type)	0·66 watt (m.h.c.p. rating) equivalent to 2·26 B.Th.U.	0·0033	3·30	3,636
(*e*) arc lamp (ordinary or plain carbon type)	1·25 watts (m.s.c.p. rating) equivalent to 4·27 B.Th.U.	0·00625	6·25	1,920
(*f*) ,, ,, (flaming or impregnated carbon type)	0·265 watt (m.s.c.p. rating) equivalent to 0·91 B.Th.U.	0·001325	1·325	9,056

* Upright mantle type. A much higher efficiency is claimed on behalf of certain oil-vapour inverted mantle lamps of relatively high luminous output (say, 300 c.p. upwards). These high-power incandescent oil lamps are spoken of in the text.

† 16 c.p. quality—old illuminating power standard. Price (say) 2s. 6d. per 1000 c.ft.

In the table, columns (*a*) and (*b*) have been calculated from the quantities given in the first column, but in certain cases the values in column (*c*) have been determined on the basis of the number of candlepower-hours provided by 1 lb. of candles, 1 gall. of oil, &c., at the listed prices. Since, in the reduction of these values from candlepower-hours per lb. or gallon to the decimal fractions of the lb. and gallon per candlepower-hour, some of the values in the first column have had to be approximated to restrict the number of figures, one or two of the end column values (*c*) will differ very slightly from the tabulated values if one evaluates them on the basis of the approximate quantities in columns (*a*) or (*b*), because, as already explained, the figures in column (*c*) have been derived from the number of candlepower-hours (as mentioned in the text) bought in the form of 1 lb. of candles, 1 gall. of oil, &c.

NOTE.—The monetary values in the above table are related to the following fair average purchase prices of the materials and electric energy involved in the light-making processes under review:

(1) Commercial candles . . . per lb. 5d.
(2) Kerosene oil, flash-point 110° Fahr. . . per gall. 14d.
(3) Town gas . . . per therm 8d.
(4) Calcium carbide . . . per lb. 2d.
(5) Petrol . . . per gall. 17d.
(6) Electric energy . . . per kilowatt-hour 5d.

tive costs of manufacturing light by different methods. I give the approximate cost with the use of the ordinary universal burner at 2d. per 1000 candle-power hours, and a preheated cluster universal at 1·28d.—a difference of nearly 40 p.ct. A well designed burner gives a duty of 18 candles per c.ft. of gas consumed, a modern cluster burner should give you a duty of 30 candles per c.ft. of gas consumed—an increase of 60 p.ct. at the cost of an extra cubic foot of gas.

With the attempt to repopularize the oil lamp (and I am told that quite a number of tenants in electrically lighted council houses use oil), a reference again to Table VI. will show its use to be rather expensive.

Illumination.

With regard to gas consumption and the resultant illumination in dealing with commercial gas lighting, there should be a simple table of working allowances. The following table suggests certain values of illumination in foot-candles for different purposes:

	Foot-Candles.*
Foundries	1½—2
Printing works	3—5
Engineering workshops	3—5
Workshop machines, lathes, &c.	3—5
Fine work, watch making, artistic chasing, &c.	7—10
Spinning sheds	2—3
Wood working shops	3—4
Drawing offices	4—6
General	3—4
School rooms	3—4
Churches	2—3

* The foot-candle is the illumination produced by a light flux of one lumen uniformly distributed over an area of one square foot. The lumen represents the quantity of light falling on one square foot of the surface of a sphere of one foot radius from a light source of one candle intensity placed at the centre of the sphere.

Corresponding to this table are the following specific consumptions which may help in calculating the number and sizes of lamps required to produce definite degrees of illumination:

System of Lighting.	Consumption in Cubic Feet of 500 B.Th.U. Gas per Hour per Foot-Candle per Sq. Ft. of Surface Illuminated.
Direct lighting	0·008
Semi-indirect lighting	0·012
Indirect lighting	0·016

(The value for "Direct Lighting" refers to units of an extensive type.)

It is necessary that careful attention be given to the choice of the burners or lamps and their general lay-out to avoid shadows and undue contrasts:

Example.

Take an area of a building in sq. ft. (say) 50 × 100 =	5,000
Multiply by foot candles required, we will say 2	5000 × 2 = 10,000
Multiply by consumption suitable for direct lighting: 0·008	0·008
	80·000
This gives you 80 c.ft. of gas per hour required.	
We decide to use No. 2 burners consuming 2½ c.ft.	25) 800 (32 75 50

32 No. 2 burners required = four 8-light or eight 4-light lamps,

and in dealing with large spaces—such as workshops and factories—gas has always a splendid opportunity. I was recently told of a gas undertaking in London competing with the electricity undertaking for the lighting of a very large factory. It was decided to put up two test installations—gas and electricity—and the gas installation, after photometric tests (carried out by the electrical undertaking), was fully approved. Gas was installed throughout the buildings!

Public Lighting.

With such splendid examples of street lighting given us in London, Birmingham, and other important cities, it is perhaps no wonder that gas more than holds its own. The Association of Public Lighting Engineers, under the able Presidency of Mr. S. B. Langlands, has done some very valuable work, and a great deal has been achieved towards improved street lighting by decreasing the diversity factor; but considerably more requires to be done. We should not wait until there is a possibility of losing public lighting before we show the responsible authorities what can be done by suitably spaced high power lamps. There is a suburb in London which for many years has been very badly lighted with old-type gas lamps with one universal mantle giving, possibly, a duty of something like 60 c.p. There is a great deal of traffic on the road, and the majority of motorists at night used their headlights. Two months since the gas lamps disappeared; 25-ft. pillars were erected with swan-necks, from which are suspended 300-watt half-watt lamps fitted with prismatic refracting plates, in spite of which there is a terrific glare which is most uncomfortable for the motorist, the lighting not having been well planned. This may be an instance of unfair competition. One does not know all the circumstances; possibly the gas undertaking was not given an opportunity by the local authority to show what modern gas lighting can do, but this district has definitely been lost.

In another London district in which there is an arterial road, you have one of the finest examples of road lighting in the Kingdom, and it is gas lighted. The portion that is completed was not won for gas without intense competition. The gas and the electricity undertakings were given an opportunity of showing what they could do, and after two years' test the authorities decided in favour of gas. In this case, 600 c.p. lamps are erected, and suspended on columns 16 ft. from ground-level and in the centre of the road, 100 ft. apart. So far, approximately 2½ miles have been lighted. The road is 11 miles in length and passes through the areas controlled by no fewer than five different councils. This installation has been most favourably commented upon by the Ministry of Transport, and many public officials have been to see it. Here you have a district that has been definitely lost by electricity.

We often find that where the electricity works is owned by the local authority, they decide to adopt electricity for this purpose at any cost. Gas is prepared to provide illumination on our roads equal to, or better than, electricity. If there is one branch of our service that can be justified, it is that of gas for street lighting. The many advantages are familiar to you. We know that they exist and are fully realized by the community; and the only way to combat unfair competition is to take every means possible of publicly showing up-to-date gas lighting, and constantly keeping it before the general public.

The ordinary 14-in. and 16-in. street lamp should have, if I may suggest it, all ordinary universal types of burner removed, and replaced by superheated cluster lights of two or three No. 1 bijou mantles. From a 3-light you can secure a duty of 165 M.H.S.C.P. consuming 5·50 c.ft. per hour; and by judicious use of refracting plates, chromium plated deflectors, and other means, you can bring your lamps up to date. Mr. Robert Watson, of Doncaster, has dealt well with this subject; and I would like to refer you to an article written by him: "Gas Journal," Feb. 20, 1929, "Directional Gas Lighting for Streets." Mr. Watson shows us very clearly by his own tests the possibilities, without alteration of existing lamp positions, of increased illumination along the road surface. When contemplating such alterations, re-arrangements, or extensions to existing installations, aim at the higher lighting values, and do not be too anxious about economy, because, after all, a lighting scheme is eventually, fortunately or unfortunately, judged on its merits when economy is forgotten.

Mr. H. T. Harrison, some few years ago, when collecting data relating to the lighting of all classes of streets and roads, stating that at that time 73 p.ct. of street lighting was carried out by gas, mentioned that the great majority of our streets were inadequately lighted; and Mr. S. B. Langlands recently stressed this point at Bournemouth.

It is not long since I read an account in a newspaper published in my native city of Bath, of the proceedings in Council in which a discussion took place on the lighting of a school in one of the outer wards of the city, and the Chairman of the Electricity Department, when told that the school was lighted by gas, expressed himself as being scandalized that in these enlightened times gas could be used for such a purpose, and drew such a horrible picture of the condition of these dear children in such circumstances that the Council were so moved that they voted for electricity. To think that such ignorance could exist in my native city hurts me beyond words. I wonder what he thinks of the Lighting Committee of the London County Council, who, in October last, decided upon the relighting of 36 schools by gas at a cost of £2032. I am glad to find that in the majority of towns the authorities fully recognize the advantages of gas as an illuminant.

The various types of distance control devices which are well-known to you, in every case have the disadvantage of by-pass attachments. There is a new device which, I think I may say now definitely, will shortly be on the market. With this you have a switch control to the burner which has no by-pass. A form of catalyst is controlled from the bunsen tube, and the burner may be turned on and off from a distance just in the same way that you control an electric lamp. This device should be a great advantage to the industry.

It is not possible to deal in the limited time at my disposal with the many other points that arise in one's mind when thinking of this subject, I have only briefly touched upon some of them, but, in conclusion, I would ask you to give this matter your earnest attention. Demonstrate up-to-date domestic lighting in your showrooms, and in your window displays. Why not appoint a gas lighting salesman to look after lighting and nothing else? To quote Mr. W. M. Mason, "It is so easy for the salesman to take the line of least resistance, and if you can come in with an order for a dozen gas fires or cookers or a big installation, it is very nice; but it is very difficult to plod along in the old way and retain what we have got. That can only be done by an enthusiastic chap who knows what he is talking about, is keen on the job, and is encouraged to do it!"

We shall have to fight very hard to retain and extend this load, but it is well worth fighting for! Some of you have been extraordinarily successful because you would not be beaten in this competition; and to those who have not been successful, I say, Start that Lighting Campaign To-Morrow!

South Metropolitan Gas Company.

Annual General Meeting.

The Ordinary General Meeting of the Proprietors of the Company was held at the Cannon Street Hotel, E.C., on Wednesday, Feb. 12—Dr. CHARLES CARPENTER, M.Inst.C.E., in the chair.

The SECRETARY (Mr. Frank Day) read the advertisement convening the meeting, and the minutes of the last ordinary general meeting. Thereafter the seal of the Company was affixed to the Register of Proprietors.

THE ADDRESS OF THE PRESIDENT.

Ladies and Gentlemen,—The first paragraph of the report informs you of the progress made during the past year in the number of our consumers and in our sales of gas. I ought to say at once, however, that there is no correlation between the two sets of figures. The increase in the number of consumers has been almost entirely the result of building activities in the south-east area of our district where new estates are being laid out on land which was until recently pasture with some tillage. Of these new houses, some 3500 were comprised in the schemes of public authorities, the remainder being constructed by private enterprise. It will be remembered that in laying out these estates a much larger area of vacant land per unit of inhabitant is taken than that ruling generally over London, and it must follow that the cost of providing roads, sewers, water, and gas is proportionately increased. In this respect, therefore, we cannot hope that our new consumers will be as profitable to us as our older ones, since the capital costs for mains and services per therm sold must be perforce higher. I might in passing remind you that the opposite policy is operating in Central London, where so many houses each occupied by one family are being pulled down to make place for blocks of flats.

I have said that there is no relation between the increased number of consumers and the increased consumption of gas which the report records. The houses were being erected over the whole year, but the gas consumption varied with the climatic conditions, and these fluctuated widely during the period under review. If we take the first two months of the year, we had to meet a considerable increase in the demand for gas, averaging 13 p.ct. and rising upon one occasion to nearly 39 p.ct. On the other hand, owing to mildness of the winter season, there was an actual reduction during the last two months of the year in the quantity of gas consumed amounting to over 3 p.ct., notwithstanding the increase in the number of consumers. The expense attached to meeting such climatic variations increases as the proportion becomes greater of gas used for heating compared with lighting. Indeed of the three public services, gas, water, and electricity, gas is most subject to the changes of demand. Water, as you know, can be stored for months on end, and is none the worse for it. Although a bench of retorts can be heated from cold in 48 hours to meet unlooked-for demands, it is none the better for it. One of the alternatives is water gas, which, however, suffers from the disability of having a distinctly higher gravity than coal gas, which is not without influence upon certain combustion appliances. A steam boiler for the generation of the electric energy can, of course, be got going in an hour or two, but the facility does not appear to render the distribution of such energy more immune from interruption, judging by the newspaper reports. I may point out that the problem which concerns us is solved differently where coke-ovens are used for the carbonizing of coal in the manufacture of town gas. In these cases the ovens can be kept continuously at work for ten or a dozen, or even twenty, years, and the variation in the demand for gas met by burning a greater or lesser quantity for heating the ovens themselves, making up the difference by the use of fuel gas producers which can rapidly be put into or out of action. We have to walk warily, however, in this matter, for I think there are no two opinions that for open fires of high-temperature coke, retort coke is the best, and we do not want, for reasons of economy in manufacture, to lower the quality of a material the use of which for domestic purposes is becoming increasingly popular.

GAS STORAGE ACCOMMODATION.

There is another aspect of the question—namely, whether we should not contemplate a considerable increase in our gas storage accommodation. As a purely economic project, there may not be much in it. But its adoption would mean that we could employ a greater number of hands in coal carbonizing during the week with a proportional reduction in Sunday labour, and, as a measure for relieving unemployment in some degree, much more could be said in its favour than for many other proposals for dealing with this knotty problem.

As regards the last sentence of the first paragraph of the report, I think this is self-explanatory. It refers to the fact that the increased gas requirements of our neighbours, the South Suburban Company, are being met by gas produced at our large riverside works at East Greenwich.

UNACCOUNTED-FOR GAS.

Turning now to the second statement of the report, I should like to draw your particular attention to the low figure for unaccounted-for gas. From time to time there arise scares, not exactly spontaneous or, I suspect, disinterested, of the risks it is alleged the public run from the distribution of town gas. Such figures as the report indicates should surely allay any uneasiness in this respect, especially when it is borne in mind that the error allowed by the Standards Department of the Board of Trade in the accuracy of consumers' gas meters is 1 p.ct. less against the consumer than against the Company. Indeed, as far as South London is concerned, the changes brought about by the increased traffic upon the roads, and the increased weights of the vehicles and their loads, have not caused any greater danger to the public by reason of the Company's distribution system, though it has certainly required a revolution in the methods of dealing with mishaps as and when they arise; surely a more practical solution of the difficulty than that suggested of placing the mains at less accessible depths, or of housing them in costly subways.

COKE AND LOW-TEMPERATURE CARBONIZATION.

I now come to the paragraph dealing with our products, which are, as you know, coke, tar, and ammonia. As regards the most important, and in the past too frequently the most despised one, coke, I really feel this is now coming into its own. We have been very much impressed with the growing importance of this change, and have spent a good deal of money in adding to our grading, cleaning, and storage plants to improve the characteristics of our product. Our main difficulty to-day is not, however, in regard to our own processes, but that which arises from the impurity—the shale and stone in fact—contained in the coal. We shall complete this year a large-scale plant at Rotherhithe by which we hope to make substantial progress in overcoming this difficulty, and we are anxiously looking forward to putting it to work.

This will perhaps be a convenient stage for me to refer to what we are doing in the matter of low-temperature carbonization. As regards the "Coalite" plant, the contractors are well forward with the construction of this; the retorts have been delivered, and the late summer should see the completion of the work in anticipation of next winter's requirements. As regards what is known as the "K.S.G." plant, there have been certain mechanical troubles arising in the operation of this which were rather disturbing. We have carbonized about 2300 tons of coal in the apparatus, and the yields therefrom have been promising. I can, indeed, go so far as to say in regard to most of the low-temperature carbonizing schemes that, simply as processes, there appears no reason why they should not be successful, but whether they can be operated as economic successes is not yet clear. Much will depend upon the utilization of the tars produced by the process. These are totally different in character from ordinary coal tar, and much research work upon them has to be carried out before we can hope to know their possibilities. Our colleague, Dr. Armstrong, recently visited America with the object, *inter alia*, of ascertaining the latest practice in the matter of coal and oil treatment, and gas utilization. His investigations there have proved very encouraging, and will provide us with much material for reflection and experiment. The practical solution which visualizes the passing of all raw coal through the Gas Company's works before it finds its way to the consumer as smokeless fuel seems quite within our grasp if the necessary encouragement is given by the public authorities.

In this connection I should like to say a word in favour of a great change initiated in the Metropolis by the London County Council as regards the sale of coke by weight instead of by measure. As large producers of coke we have looked upon this attitude with fullest sympathy from the beginning, for it provided a security for the consumer unattainable, in our opinion, by any other means, and the costs of making the change have been negligible compared with the great benefit to the coke business which will undoubtedly accrue therefrom.

AMMONIA AND TAR.

I must now refer to our other primary products. Ammonia, which once figured so largely in our revenue account, only brought us in the relatively small amount stated. The various means of converting atmospheric nitrogen into ammonia have completely changed the pre-war position as regards this fertilizer, which every civilized country is now producing for its own needs with greater or less completeness. In fact, it would not be incorrect to say that to-day there is an over-production in relation to the world's requirements, a position which would have greatly intrigued the late Prof. Sir William Crookes had he been alive to witness it. The recovery of ammonia from gas is, of course, a compulsory operation—one which to-day is being carried on at a loss by the smaller undertakings, which cannot possibly make a profit at present prices.

The market for tar reached bottom during the year, and there are now signs that a reaction, though slight, has set in. Creosote, the principal distillation product, is largely exported to America. On top of a reduction in the quota that country is taking from Europe, there came the Wall Street panic which aggravated the trouble by its effect upon prices; and the situation has only recently righted itself. The use of tar for road making continues to extend, and we ourselves are continually carrying out large-scale road experiments with the object of ascertaining the best material, or combination of materials, for the purpose. During the last five-and-twenty years we have kept an increasingly careful eye upon the quality of our tar, and whenever we have modified our carbonizing methods we have borne in mind the importance of regarding tar as a product, rather than a bye-product, of the process. The dissatisfaction sometimes expressed in regard to its use has almost invariably arisen from the practice of using it anyhow. But if the right class of material is chosen, and it is applied in the right manner, it will hold its own against competitors in producing a non-slippery road surface. The alternative to the preparation of tar for road making is to carry the distillation process still further, and to make pitch. The market for this has not been so favourable of late, but, again, owing to our tar quality, we are always able to obtain our share in it.

REPAIRS AND MAINTENANCE OF WORKS.

The report goes on to draw attention to the heavy expenditure in respect of repairs and maintenance of works. We hope in the

future to reap our reward for this in the shape of increased yields of products and reduced costs of working, but it is too early yet to do more than express the hope that the expectations of our technical officials will be realized. I am bound to say that we have been in the past slow to adopt what is to-day euphemistically described as rationalization, or, in other words, to instal machinery wherever we could to displace labour. No one regrets more than I do this change of our policy, but we cannot afford to stand still in face of a State-supported electrical competition which stops at nothing in its search for economy, even by erecting power producing plants in proximity to our pleasure parks.

Two years ago you authorized an application to Parliament for an increase of our capital powers. The Bill duly became law, but owing to an oversight a year ago, you were not asked to authorize the issue of that capital as and when required. That omission you are now asked to rectify, as the time is approaching when an issue will have to be made. Our bank loan is not, it is true, excessive, but we are using in our business a larger proportion of our employees' funds than is considered desirable, and we ought to replace some of this by new capital.

Co-Partnership.

Of the continued value of our co-partnership, it is impossible to speak too highly. More than forty years ago my predecessor in this Chair propounded a solution of the labour *versus* capital problem which has stood the test of time and of changing time. Professor and politician have in the past proved to their satisfaction that as a policy co-partnership in industry is ill-conceived and ineffective. We can in reply point to ours, wrought by us as pioneers in its application to the production and sale of gas, and of which we can in truth say it is an active vital force, humanizing in its influence and inspiring in its ideals. [" Hear, hear."]

The recommended dividend on the year's working is the modest one of 6¼ p.ct. The amount added to the 5 p.ct. allowed on our ordinary capital under the basic rate arrangement is in round figures £83,874, and a similar amount is therefore automatically paid over to the trustees of the Co-Partnership Fund. It is also proposed to replace to the extent of £30,000 our recent drawings upon the Special Purposes Fund for meeting extra charges in respect of purifier and gasholder repairs; and our endeavour will be to build up this fund as soon as possible more nearly to the limits prescribed and contemplated by our Acts.

The Coal Question.

These are the main features, and I have so far left untouched the most serious of all the matters with which we are face to face to-day. The late Lord Oxford aptly described coal as the " life blood of the nation," and that is especially true of that part of the nation comprised by the gas industry. Of the 245 million tons raised annually in this country, it uses but 16½ millions, a disproportion which constitutes a great handicap in making its voice heard effectively compared with the organization which speaks for practically all the proprietors of collieries on the one hand, or the Union which voices the aspirations of all the employees in them on the other. No reference to the coal question would be complete without including that of hours; and I must say a word or two with regard to this before I come to the most important part of the subject to which I desire to direct your attention this afternoon. The primary duty of a trade union, the one that comes first and foremost before all others, is the finding of, and the maintenance of its members in, employment; that necessity is ever paramount in its leaders' minds, and no one can wonder, least of all those who have had to face the spectre of unemployment, even with the relief given to-day by mutual insurance, that the avoidance of unemployment and the provision of regular work is the direction towards which their leaders first look for the amelioration of their members' status. Of all methods of achieving this, none is more popular with them than the reduction of hours. It is so simple a process. Assume there is available work to be carried out which needs (say) forty thousand hours' work in one month. With a normal working of fifty hours per week, work would be available for 200 men. But 220 could be employed if the week were reduced to one of forty-five hours. Little fault could be found with such a policy directed towards a seven-and-a-half or even a seven-hour day for the coal industry if other nations followed suit, and that, of course, depends on how far labour discussions in Geneva crystallize into accomplished facts. As a buyer of coal, therefore, I am not greatly concerned in the matter of miners' hours, always provided their relationship to those current in other coal producing countries is recognized. No one who knows anything about a miner's life can fail to be sympathetic with him in his endeavours to minimize its disabilities. And touching upon this, I should like to make a practical suggestion founded upon practical experience. Attention has been called to the increase in the number of mining accidents. It is my belief that these would be reduced, not by the appointment of more Government officials, but by an inquiry into each accident, made by a jury of colliery employees under the chairmanship of the manager or his deputy. The system has been followed in all this Company's works for many years past, and it has proved most effective in minimizing danger to life and limb.

I pass now to the marketing side of coal. It has been seriously suggested, and I say seriously because I understand the view has been accepted in Government circles, that—I quote letters in the Press of two or three weeks since—" Gas producers have been using coal under cost for many years past owing to the foolish competition of gas coal pits," and again, " It is now well known to the majority of the public that for some years past gas companies have obtained supplies of fuel at prices very much lower than the cost of production." And again, " Gas companies are stated to have formed buying rings by which they have played off one colliery against another." Finally, the President of the Board of Trade is reported to have stated that " all parties recognized that they could not continue to sell coal to public utility enterprises like gas, electricity, railways, &c., either at a loss or at an unremunerative level."

So far as London is concerned, those statements are ill-founded. I have been closely associated for the past twenty-five years with the purchase of the gas coal required by this Company, and I can unhesitatingly say it has never been a member of any buying ring or other like organization. [" Hear, hear."] It has always bargained separately and independently for its supplies of coal. But it is said of us, " You have not paid a fair price for your coal." What is a fair price, and how can it be tested? We have gone, through our agent, on to the Coal Exchange, and paid within a few pence the price we were asked, after, of course, the bargaining inseparable from all such matters. Some twenty-five years or so ago we interested ourselves in the output of a new colliery in Durham, the district from which we mainly draw our supplies. We as users worked sympathetically with them as producers in their efforts to turn out coal suitable for gas production, and we have been customers of that colliery ever since. A few weeks ago it declared a dividend of 7½ p.ct. Does that support the suggestion that we have bought under the cost of production?

I have been associated for some sixteen years with a Company engaged in the supply of gas to some important cities on the Continent. The prices it has paid for Durham coal have been on the whole easier rather than harder as compared with London purchases. Is it suggested that this undertaking, too, has been paying less than the cost of production for its coal supplies abroad? Finally, let me quote the statement placed before the Samuel Commission on behalf of the coke oven owners to the effect that the average price at which coal was delivered, including carriage, to coke ovens for the period Jan. 1 to Oct. 31, 1925, was 11s. 6d. per ton. To make the comparison on all fours, the cost of leadage, averaging about another shilling should be added. But the difference remains sufficiently startling. During the same period the cost per ton of our own supplies delivered at the port of shipment was 18s. 11d. It is no business of mine if a colliery undertaking forms a subsidiary company to erect and work coke ovens, but I have cause for complaint if it supplies that company with coal at a price below the market value, and desires to make up the difference by charging me more.

Lastly, I must say a few words about the compulsory amalgamation of colliery undertakings which are to be carried out by a body of Commissioners the cost of whom, including their subsistence and other allowances, technical and other assistance, including valuers and expert help, is estimated to amount to a quarter-of-a-million pounds sterling per annum. Most of those engaged in the conduct of industries on the large scale, whether as managers or accountants, have had some experience in amalgamations. Some have been successful, not a few have resulted in failure. But in any case amalgamation should be the willing fusion of two or more undertakings able to pool their experience and resources for the public good. What will happen, I wonder, to the affairs of our old friends of the seven-and-a-half per cent. dividend to whom I just referred if they are required to take over, willy nilly, the responsibilities of one of those other undertakings, bankrupt to-day, but which in the past provided large fortunes for those associated with them? Furthermore, it is suggested that every colliery should have a quota of production whether it is producing coal economically or not; in other words, that the well-managed collieries will be prohibited from working full if the demand falls off. Of all proposals, this seems to me most undesirable. Here we have the very contrary of the official attitude to the generation of electric energy, where the uneconomical power units are to be closed down wherever they may be so that their place may be taken by the super stations.

And, finally, we are to be required as gas companies to contribute to a subsidy levied in order that the foreigner may buy his coal at a lower price than we shall ourselves. The Samuel Commission expressed itself very clearly against the soundness of such a proposal.

Ladies and Gentlemen, I have but touched upon the fringe of my subject, and though I could say much more I must not detain you any longer. Let me, in conclusion, quote the opinion of one of our greatest industrialists—one, too, who has large coal interests—as to the main factors needed to re-establish the coal industry in this country on a sound economic basis. Lord Melchett has summed up the position by saying that it needs internal reorganization in technology, in commercial control, in labour relations, and in the closing down of uneconomic units. I believe there are a sufficient number of enlightened, capable men in that industry to bring about such reorganization as Lord Melchett advocates. And as one profoundly interested in the well-being of the coal industry, its modern organization, and its technical possibilities, let me express the fervent hope that it may be left undisturbed by Government interference to carry out its development in its own way and by its own people, now that the hours question has to all intents and purposes been determined.

We are sometimes referred to, deprecatingly, as monopolists. The only monopoly gas undertakings have is the supply of one particular form of energy—namely, gas. The electrician on the one hand, and the oil merchant on the other, have free rights over our domain, and are only restrained from wiping us out of existence by the superiority and convenience, and price, of our particular form of energy. In our other manufactured products, whether they be the various grades of coke, or tar, or of ammonia, colliery coke ovens can compete unrestrictedly.

I have now to move:

> That the Report and Accounts now presented be received and adopted, and the Report entered on the Minutes.

The Vice-President (Mr. Frank H. Jones) seconded the resolution.

The Rev. George Martin: I understand that, on account of the reorganization of work, a number of men have been replaced by women. In view of the fact that there are so many men unemployed, I feel that many of us would be glad to receive a lower rate of interest if the old traditions of this Company as to the employment of men, for whom we in South London have so much respect, could be maintained as far as possible.

The President: I take it that our friend refers to the fact that

we have, in developing our business, been able to do away with the need for collecting gas accounts by male labour. We have made that change, and we have appropriately compensated those displaced. With regard to the change itself, there can be no two opinions. There is no longer to-day any need for the gas collector to go round at quarterly intervals collecting our gas accounts. In my opinion, and in that of my colleagues, that system is an anachronism. In the course of this development we have been looking into our general system of book-keeping, and we have substituted for our old methods a system of mechanical appliances operated by female labour. I am not going to say that male labour cannot operate typewriters, or machines of that class. It can—I do myself—but I think the average man would not regard it as an ideal occupation, and the fact does remain that it is one for which female labour is particularly adapted. There is another advantage in this matter, which arises from the fact that these young women do not, as a matter of course, stay many years in our service. They are intelligent young ladies, and in due course they get married. They commence family life with some knowledge of co-partnership, and of what it has done for them during their employment. They also know something of the gas undertaking, and of what it does for the public. I hope you will consider that explanation satisfactory. ["Hear, hear."]

The resolution for the adoption of the report and accounts was then put to the meeting, and carried unanimously.

THE DIVIDEND.

The PRESIDENT then moved:

> That the following dividends be now declared—viz., 6 p.ct. per annum for the half-year ended 31st December last on the preference stock, and 6½ p.ct. for the year ended 31st December last on the ordinary stock, *less* the interim dividend paid in respect of the first half of the year: and that warrants be transmitted to the registered addresses of the proprietors by post for the amount of such dividends.

Dr. E. FRANKLAND ARMSTRONG, F.R.S., seconded the resolution, which was carried.

NEW CAPITAL ISSUE.

The PRESIDENT: I beg now formally to move the resolutions with regard to the issue of further capital, to which I referred in my address. They are as follows:

(1) That the Company do hereby create, as authorized by the South Metropolitan Gas Act, 1928, further capital to the extent of £1,000,000.
(2) That the Directors be hereby authorized (subject to the provisions of the said Act) to issue the same as ordinary or preference stock, or partly by the one and partly by the other of those modes, on such terms and conditions and at such times as the Directors may think desirable.
(3) That the Company do hereby create as authorized by the said Act further debenture stock to the extent of £1,000,000.
(4) That the Directors be hereby authorized (subject to the provisions of the said Act) to issue the same at such rate or rates of interest and otherwise on such terms and conditions and at such times as the Directors may think desirable.

The VICE-PRESIDENT seconded this motion, which was put to the meeting and carried unaimously.

RE-ELECTION OF DIRECTORS.

The PRESIDENT: I now move that Mr. Frank Bush and Mr. Arthur M. Paddon be re-elected Directors of the Company. These two gentlemen have had a long association with the gas industry. They are very valuable members of the Board, and I am fortunate in being able to ask you to re-elect them.

The VICE-PRESIDENT, in seconding the resolution, said: I am pleased to do this because Mr. Paddon is a Director of very great experience; and I have particular pleasure also in seconding the re-election of Mr. Bush. Not only is he a charming colleague, but he has one of the shrewdest minds in the gas industry.

The resolution was carried, and acknowledged by Mr. BUSH and Mr. PADDON.

Mr. A. B. PASMORE moved the re-election of the retiring Auditor (Mr. Charles Pelham Crookenden, F.C.A.), and this was agreed to.

VOTE OF THANKS.

Mr. M. MCDONALD: I should like to propose a vote of thanks to the President, Directors, Officers, and other employees of all ranks for their attention to the interests of the Company. I have been a shareholder for a great many years, and have generally attended the meetings; and I have always found everybody very sympathetic, and the Directors anxious to do their duty to the public.

This was seconded by Mr. R. L. WILSON, and carried with applause.

The PRESIDENT: On behalf of my colleagues and myself, may I say how much we appreciate the reward to which we look forward at these annual meetings—of knowing that the work of the past twelve months has met with your sympathy and approval. I would like to say what I have said on previous occasions—how much we owe to our officials and workpeople. It always seems to me that the greater the difficulties apparent in the conduct of our business—and I suppose, like all other businesses, it gets more complicated as time goes on—the greater is the desire to meet those difficulties and surmount them. The test of their work is the report and accounts which have been before you this afternoon. I should like to express on the part of the staff and employees, their thanks for the vote you have been so good as to pass.

Commercial Gas Company.

Annual Ordinary Meeting.

The Annual Ordinary Meeting of the Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW, C.B.E. (the Chairman), presiding.

The GENERAL MANAGER AND SECRETARY (Mr. F. J. Bradfield) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN: Gentlemen,—We are pleased to be in a position to present to you accounts which justify us in recommending a continuance of the dividend paid for the two previous years—viz., at the rate of 7 p.ct. per annum for the half-year, which, coupled with the interim dividend paid for the first half of the year at the rate of 5 p.ct. per annum, gives a dividend for the year of 6 p.ct.

CLIMATIC CONDITIONS.

When I addressed you a year ago the country was experiencing a very long spell of cold frosty weather. The gas output was extremely good, and there was every prospect of the Company having a record year. As a matter of fact, for the first six months the sales of gas were greater than in any other half-year, but the abnormally fine weather during the summer, followed by the long period of wet but very mild days in the autumn, more than discounted the advantage gained in the earlier months of the year, with the result that we have to record a small reduction in the output of about 1½ p.ct., as compared with that for the year 1928.

I do not want to give the impression that the reduction in sales, though it is not unimportant, is due solely to the weather conditions. Another factor is the general trade depression, which, as I have often reminded you, has an immediate effect in the Company's district which is almost entirely industrial. It is, however, encouraging to hear that certain docks in the Port of London are experiencing better conditions than for some years past. In fact, the controlling Authority reports a record tonnage during the latter part of last year, and it has been stated that at times they have difficulty in securing sufficient labour. As perhaps you are aware, the Authority has recently, at very great expense, made extensions and alterations to the docks, in order to accommodate larger vessels than formerly, and the increased employment which it is expected will ensure will have an important bearing on the prosperity of the district and, incidentally, of the Company.

You will readily understand that the local municipal electric undertakings are making strenuous efforts to secure the whole of the lighting. This our officers are combating to the utmost of their power; and we regard it as very satisfactory, having regard to all the circumstances, that they have practically maintained the sales of the previous year.

FINANCIAL POSITION.

Another factor which has adversely affected the earnings of the year is the high bank rate which has prevailed, which means that the temporary loan from our bankers has cost us considerably more than the previous year.

POLITICAL INTERFERENCE.

It has always been the rule of the Gas Company to refrain from any participation in either local or Imperial politics, but of late years the industry has been subjected to so much injurious legislation that it has become necessary to make a protest against the continual interference with it by adverse enactments. Last year I had to draw your attention to the support given to our competitor—electricity—which, of course, still continues. This year there are two matters to which I must refer. During the last few months of the tenure of office of the Conservative Government the De-rating Act was passed, which was intended to relieve the manufacturers of the large part of the local rates. It was made clear from the introduction of the Bill that public utility undertakings would not, as such, benefit by the measure, but strong representations were made to the responsible Minister that 25 p.ct. of the total revenue of gas undertakings is derived from the sale of residuals, and that, as our competitors—viz., the coke oven companies and low-temperature carbonization companies—were receiving the relief, the gas industry in equity should also participate therein. However, after many interviews, and notwithstanding a provisional understanding come to with the responsible Minister, the Government refused to include the undertakings under the scheme, for the reason that, as most of the monies available would, in proportion, be absorbed by the gas industry, it would leave an infinitesimal amount for our competitors, the coke oven and low-temperature carbonization companies.

THE COAL MINES BILL.

The second matter is more serious, and is one of which all of you will have some knowledge. No sooner did the present Labour Government come into power than it was obvious that the election promises made to the miners would, with a slight modification, be carried out, and the publication of the Coal Mines Bill made it clear that the proposals would lead to an increase in the cost of coal. It is wholly unacceptable to industry, and there are the gravest apprehensions as to its effect. Apart from the anticipated increase in

the cost of coal, which would bring about an immediate increase in the cost of gas, it places coal supplies, as regards both quantity and quality, very largely under the control of organizations, compulsorily established by statute, which could impede or direct the natural flow of such supplies.

Meetings of protest against the Bill are being held all over the country, and it behoves us all, stockholders and consumers, to protest against this proposed legislation, which is unsound in principle and fraught with danger to the whole of British industry.

We had, prior to the Election, secured the Company's requirements of coal at satisfactory rates up to June, 1930, and we had also purchased a portion of the quantity required for the year to June, 1931. After very careful consideration it was resolved to complete the purchases for that period, and, though a slightly higher price had to be conceded, I think you will agree that the Board's action, having regard to the Bill which is still being pressed forward, has been more than justified.

Coal.

While on the question of coal, I must comment on the statements of the coal owners that public utility undertakings purchase their coal under cost. In these statements no discrimination is shown regarding the nature of the public supplies, and there is nothing said about the selling of coal abroad at a lower price than for home use. To my mind, it is ridiculous to argue that the coal fitters and factors, who have always shown themselves very much alive to their own interests, are not able to negotiate the sale of their product to such purchasers as gas companies when they well know that the companies must have their coal. My experience is that they are more than able to hold their own in any negotiations, and I can only regard such statements as misleading to the public and uninformed politicians.

I cannot emphasize too strongly that the industry asks only for fair treatment—no preference and no favour—and that coal shall be sold under the natural law of supply and demand. It is, however, the fact that, if any additional cost of coal is caused by legislative action, it will adversely affect our principal competitor electricity to a greater extent than gas. It is true that the coal used by electrical undertakings is of an inferior quality to gas coal, but the higher cost of the latter is materially reduced by the receipts from the sale of residual products. It is not generally realized that, whereas the net cost of coal represents approximately 20 p.ct. of the gas undertakings' total net expenditure, the fuel cost of electrical undertakings in East London is usually over 40 p.ct. of the total expenditure.

Accounts.

If you will turn to the accounts, you will see, in Account No. 3, that the capital expenditure has been increased by the sum of £6535 19s. This represents expenditure on additional plant of £14,899 19s. 7d., *less* the sums written off existing apparatus. So far as can be seen at the present time there is little capital expenditure to be met in the immediate future, and I hope to see the capital expended per million c.ft. reduced, though it stands now at the satisfactory figure of £418 per million, or per 5000 therms—*i.e.*, 1s. 8d. per therm.

From the revenue account, you will notice that the gross profit—*i.e.*, the balance carried to net revenue account—amounts to £141,058. This compares with £139,808 in the previous year.

Comparing the principal items in the revenue account, coal and oil cost less by £5361, carbonizing wages were less by £2231, repairs and maintenance of plant cost less by £26,313, distribution was also less by £2281, and rents, rates, and taxes were less by £5022—or together £41,208. Deducting variations in other items, £1933, this leaves a net saving of £39,275.

I should point out that in 1928 there was a large sum charged to revenue for holder expenditure at Poplar. The expenditure last year on the works and distribution plant amounted to 1·66d. per therm on the works and 2·26d. per therm on the district, together 3·92d. per therm, and this figure may be regarded as ample. In point of fact, it compares very favourably with the sums so spent by our larger and richer neighbours.

On the credit side of the account, gas receipts realized less by £11,938, rentals were less by £2219, and residuals were less by £24,631—or together £38,788. Deducting an improvement in the miscellaneous receipts of £762, this leaves a net loss of £38,026, so that there is a small increase in the revenue account balance of £1249.

The amount carried to the net revenue account is £141,057 13s. 7d. Adding the balance brought forward from the previous year, £45,406 5s. 8d., makes £186,463 19s. 3d. Deducting therefrom interest on debenture stock and other interest on temporary loans, £26,578 14s. 10d., and the interim dividend paid for the first half of the year £51,832—together £78,410 14s. 10d.—leaves £108,053 4s. 5d. The dividend recommended for the second half of the year amounts to £72,564 16s., and the carry forward will be £35,488 8s. 5d.

Having regard to the large amount of work done, both on the works and on the district, we think the result is satisfactory, especially when there is such a substantial amount as £70,737 invested in trustees securities standing to the credit of the reserve fund.

Residuals.

It will be apparent to you that, but for the reduction of £24,631 in the receipts from residuals, the accounts would have shown a still more favourable result. The average price obtained for coke was quite good—in fact, it was 1d. per ton more than the previous year, at 20s. 8d. per ton.

Tar, however, has been an anxiety the whole of the year, and the values of the crude product and its constituent distillates have gradually fallen. I am glad to say, however, that there are distinct signs of better prices for road tar, pitch, and creosote being obtainable. No one objects to paying an economic price for a commodity. Too high a price is almost as harmful as too low a price. This was illustrated in the case of road tar a few years ago, when the price soared to such a high figure that it created a demand for bitumen, and the demand for coal tar rapidly fell. This has now adjusted itself; but not before prices had suffered a very important and serious diminution.

Though the loss in cash for ammoniacal liquor is not large, depending as it does mainly on the price obtained for sulphate of ammonia, the future is not promising. Owing to the increasing production of synthetic sulphate of ammonia, both abroad and at home, values are being reduced to almost an unremunerative figure. In fact, many of the smaller suburban and provincial companies have ceased the manufacture altogether. As I have mentioned before, the Company's figures, by reason of economy of manufacture and the production of our own sulphuric acid at a low cost, compare more than favourably with those of many other companies; and it is a matter for congratulation that we shall probably be able to produce the salt profitably as long as, if not longer than, other gas companies. There is little doubt that sulphate of ammonia is one of the cheapest fertilizers at the present time, and its increased use may lead to a recovery in price; but if this anticipation is not realized, and the price is forced down much lower by over-production, it is clear that, though the smaller producers may have to give up first, the larger and financially stronger "synthetic" producer will be considerably weakened.

There are one or two satisfactory features among the remaining items of expenditure. The heavy repairs which had to be undertaken on the gasholders are almost at an end, and so far as can be foreseen we may expect a reduction in expenditure for such work.

Reduction in Rates.

One very satisfactory saving is the further reduction in rates of £5022. This follows a reduction of £4155 in the previous year. These reductions, which are wholly due to poundage, and not to assessable value, are very significant. I emphasized this last year, and it cannot have too much stress laid upon it. The tax on industry and manufacture brought about in former years by the high local charges are being reduced, and Stepney and Poplar are now, by reason of their close proximity to Central London, very attractive districts. When this is generally known—and I understand it is becoming known—the return of the old, and possibly some new, manufactures and industries may be confidently expected. There is very little more to which I need draw your attention. The working results have been well maintained.

The make of therms per ton of coal showed a still further improvement at 73·09. I have already referred to coke. The tar made was 9·28 gallons and the liquor 39·25 gallons per ton of coal.

Borrowing Powers.

There is one alteration on the accounts to which I might call your attention. By the passing of the Gas Undertakings Act, 1929, gas companies are authorized to borrow up to one-half of the paid-up capital, including premiums; and this has the effect of increasing the borrowing powers of the Company from £699,226 to £1,060,958, which leaves the amount unissued of £577,240, against the former total of £228,452. It will be seen that the Statement of Loan Capital No. 2 has been varied accordingly.

Position and Prospects of the Company.

Now, gentlemen, it has been my custom to close my address to you by a few remarks on the position and prospects of the Company, not by way of prophecy or forecast of future events or results, but in order to acquaint you with the existing facts of the situation from which you can draw your own conclusions.

It is well known that the district served by our Company is surrounded by the area of supply of other companies, and is incapable of expansion. That was equally true 42 years ago when I became a Director of the Company, and in spite of it we have not fallen behind our more fortunate neighbours with expanding districts either in the service which we have rendered to our customers, or the dividend which we have paid to our shareholders, or the benefits which we have been able to give to our employees, or the reserves set aside for a rainy day; and though there are certain things which at the present time are affecting the growth of our business, I believe that they are mostly temporary and will pass away. Of course, the prevailing slackness of trade restricts the spending power not only of the manufacturers in one district, but also of most of the residents; yet slack trade will give way in time to generally improved methods of manufacture and lessened costs of production, and prosperity will return to our country and its trade as it has in past days.

I have already pointed out that the excessive rates which have driven industries and manufactures from our district, and caused there a degree of unemployment which rendered it obligatory on the working classes to stint themselves in every article of domestic consumption, including gas, have been, and will be still further, reduced, and the East End, with its undeniable advantages for industrial and commercial purposes of its situation close to the business part of London and the docks, and the convenience which it offers of rail and water carriage, will again attract new industries and manufactures, and tempt back those which were driven away. At the present time our coals cost us more than those of either of the two Metropolitan Companies by in one case 2s. 3d. a ton and the other of 10d. a ton, *not* because we cannot buy as cheaply as they do, but owing to the fact that we have three small works, only one of which (and that the smallest) is on the River Thames, so that more than half the coal we use has to be transhipped into barges or lorries, and the comparatively small quantity which is used in the works on the Thames has to be carried in small ships which are extremely expensive to run. If we can find a way of cheapening the cost of transport from the North there will be a substantial saving in our expenditure and a corresponding increase in our profits.

I need not remind you that the electricity undertakings in our dis-

trict are owned by the Borough Councils, and that we have had for many years to face this competition. The fact that this is the case accounts for the almost total loss of the public lighting (though that is not a very serious matter so far as profit is concerned, for I doubt whether public lighting contracts are remunerative except perhaps in a very small number of abnormal cases), but it has involved the loss of the sale of a considerable volume of gas and caused the Company to appear to have made less progress than has been really the case. Possibly it has carried with it the loss of some of the private lighting. At any rate you will realize that we have had to deal with competitors who held all the trump cards in their hands.

Well, gentlemen, these are special difficulties which we have had to face and overcome, and I think that I may claim that we have been successful to some extent—at any rate I hope that you will think that I was not exaggerating when I said in the first sentence of this address that we present to you accounts which justify us in recommending a dividend at the usual rate of 7 p.ct. per annum for the half-year.

I have always been an optimist so far as the Commercial Gas Company is concerned, if you will allow me the definition that an optimist is one who sees an opportunity in every difficulty, while a pessimist is one who sees a difficulty in every opportunity; and my optimistic inclinations have suffered no diminution through the results of the year 1929, the accounts of which I now have the pleasure to recommend for your adoption.

I have only one word to add, and it is this, that we owe our best thanks to all ranks and classes of the Company's employees for the admirable work which has been done by them, and for the zeal and energy which they have displayed; and an expression of our appreciation is specially due to our Chief Officers, Mr. F. J. Bradfield and Mr. A. E. Williams, who, as always, have not spared themselves in their endeavour to secure the prosperity of the undertaking.

I now move that the report and accounts be received, adopted, and entered on the minutes.

Mr. HENRY WILLINGHAM GELL, O.B.E. (Deputy-Chairman), seconded the resolution, which was carried unanimously.

DECLARATION OF DIVIDENDS.

The CHAIRMAN then moved:

> That pursuant to the recommendation of the Board of Directors, a final dividend be declared for the half-year ended Dec. 31, 1929, at the rate of 7 p.ct. per annum on the ordinary stock of the Company, *less* income-tax, making, with the interim dividend of 5 p.ct. per annum, *less* income-tax, paid for the June half-year, 6 p.ct. for the year, payable on Feb. 15, and that warrants for the same be forwarded by post to the proprietors.

Mr. GELL seconded this resolution, which was agreed to.

RE-ELECTIONS.

The CHAIRMAN: I now move that the retiring Directors, Mr. Stanley Hunter Jones, M.Inst.C.E., Dr. Charles Carpenter, C.B.E., D.Sc., M.Inst.C.E., and Mr. Harold Godfrey Palmer, be, and they are hereby, re-elected Directors of the Company. I need not say a word in their favour. If one wished to have a new Board, there are not three gentlemen in the whole of the land to whom one would rather go than these three. We are very fortunate in having their services, and I cannot say how valuable to the Company these services are.

Mr. GELL seconded the proposition, which was carried.

Mr. HILLS proposed the re-election of the retiring Auditor, Mr. B. W. Ellis.

This was seconded by the Rev. W. B. GOWAN, and agreed to.

VOTES OF THANKS.

Mr. GELL, in proposing a vote of thanks to the officials and staff of the Company, said he would like to express their recognition of the zeal and energy with which all carried on their work. He had no need to say more about the services of Mr. Bradfield and Mr. Williams. Every year added to the value of their services and the warmth of the Directors' appreciation. Their zeal and energy permeated the whole staff to the lowest ranks of the employees. It had been their practice, year by year, to give, in the autumn, a staff dinner to their employees, and it had been the custom for one of the Directors to take the Chair. This year Mr. Paddon did so, and he could not do better than ask him to second the resolution.

Mr. A. M. PADDON, M.Inst.C.E., remarked that fortunately his experience of the staff was not confined to the dinner, though they did very well there. [Laughter.] He said that at one time or another he had been pupil, engineer, executive officer, Director, and even Chairman of gas undertakings, so that he should have a comprehensive outlook upon the difficulties to be overcome in producing these excellent results.

The resolution was carried with acclamation.

Sir ERNEST LAMB, proposing a vote of thanks to the Chairman and Directors, said they could not have had a more authoritative statement than that which they had just heard.

Mr. FRANK JONES seconded this proposal, which was unanimously passed.

The CHAIRMAN thanked those present for the terms in which they had alluded to the Board. They were very gratified to know that they retained the confidence of the shareholders, and that they were satisfied with the results of the year's work.

South Suburban Gas Company.

Annual Meeting.

The Annual Ordinary General Meeting of the proprietors of the South Suburban Gas Company was held at the Cannon Street Hotel, Cannon Street, London, E.C., on Friday, Feb. 14—Dr. CHARLES CARPENTER, C.B.E. (Chairman of the Company), presiding.

Mr. WILFRID WASTELL (Commercial Manager and Secretary) read the notice convening the meeting.

The minutes of the previous meeting were taken as read, and the Chairman sealed the Register of Proprietors.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, proposing the adoption of the Directors' Report and Accounts for the year ended Dec. 31, 1929, said: Ladies and Gentlemen,—I presume you will, as usual, take the accounts as read, and I think perhaps it will be most convenient if I take out of its turn the second paragraph of the report, because this refers to the least satisfactory features of the year's accounts. The report tells you that, after taking £7718 from the reserve fund, there remains a balance of £50,738, which, after payment of dividends at the same rate as before, leaves £565 to be carried forward. The real strength of the undertaking, paradoxical though that may appear, is shown not in that particular paragraph, but in the remaining statements of the report. There is one thing above all others which is the true test both of our working and of our stability, and that is the price at which we sell our gas. Those of you who follow year by year the working of the Company through the medium of the accounts will remember that we brought into the year's account a balance of £38,373. With this in mind we decided that the time had come to reduce the price of gas, which was in our opinion at a point higher than would encourage extension of business to the degree we hoped and desired. That is a practice which we have followed for a great many years past; when we accumulate a balance and carry-forward we at once reduce the price. We knew that to do this would use up a substantial portion of our last year's balance, but we have always applied our accumulated balances to reducing the price of gas, since by so doing we furnished the most extensive encouragement to its increased use. There was an additional complication in 1929; we did not estimate in our forecast so great a fall in our receipts from residual products, the return from which, though we carbonized 8000 tons less coal, returned £27,500 less than in the corresponding period. It has happened, too, that our repairs and maintenance have been unusually heavy. We have carried out a good deal of gasholder replacement work the cost of which might have been met from the special purposes fund, upon which it would have been doubtless a legitimate charge, but which upon consideration we decided to meet out of current revenue.

Furthermore, we have carried out, and charged to revenue, following our usual practice, a good deal of mains replacement, which should not be a recurring expense. We have, too, been somewhat more liberal in our expenditure upon other distribution charges, and on these items we shall be able to make considerable reductions in our current expenditure. The difficulties of the year, arising from the price reduction I may say, are apparent from the accounts, but I think you will agree it was, in all the circumstances, the right course to adopt. We have been through the estimates of this present year's working, and we have no doubt that, with the price of gas at the point to which we reduced it last year, we shall be able to make both ends meet—that is to say, instead of relying upon the carry-forward, as we did in 1929, we shall find a working balance at the end of the year. I think there is very frequently a lack of understanding with regard to the particular application of gas undertakings to-day. It is perfectly simple, of course, to make what appears to be a favourable balance-sheet if you charge a high price for your gas. It is the easiest thing in the world to send out notices to the effect that the price of gas is going to be increased another two-fifths of a penny per therm. That figure looks very small; an addition of that amount in the price of gas would have made 1929 stand soundly by itself; but our experience in these matters, which dates back a great many years, shows that this policy is a harmful one, because it does happen that in nearly all cases as the result of an increase in the price of gas the consumer sets to work to economize. On the other hand, if you inform him that there is to be a reduction in price he uses gas more liberally than he would do otherwise. That is our very general experience. I do not think I need labour that point further.

INCREASED SALES OF GAS.

In all other respects the progress of our business has been satis-

factory. The sales of gas, excluding the consumption due to Northfleet, have increased by 5·93 p.ct. The increase of 6¼ p.ct., mentioned in the report, includes Northfleet, but the truest comparison is made, of course, by excluding Northfleet. Quite apart from what has been done at Northfleet, we have added a substantial number of consumers, and we have added substantially to the number of appliances that we have either hired out or sold. The total increase during the year is a very remarkable one. In the case of cookers it is 5672, fires 3750, and other appliances 2884, making a total of 12,306. I think you will agree that that is a very satisfactory indication of the increase in our business.

The taking over of the Northfleet Company, besides proving a good investment for us, was almost a necessity. The Company was a small non-statutory one sandwiched in between ourselves and another undertaking, and very badly placed to supply gas efficiently or satisfactorily. The position of so handicapped a centre of manufacture on the border of our Dartford area was not conducive to such a favourable attitude on the part of consumers to their gas supplies as should be the case. Unfortunately, in the matter of gas supply, we have not only to rely upon the good feeling of our own consumers; there are always changes, and if a dissatisfied or disgruntled consumer comes from one area to another it is not very helpful to us in our efforts to improve the general attitude of consumers to gas supply.

Showrooms.

While dealing with our attitude to the consumers, I ought to mention a statement on the revenue account which may, if not made clear, give rise to an inaccurate understanding of the true position as regards the price of gas. The revenue account shows that we sell gas at 9d., 9¼d., 9½d., and 12d. per therm. That is very misleading, because, as the result of the arrangements made in connection with the amalgamations that have taken place in the past, differential prices have almost wholly disappeared. Unlike some of our neighbours we are, I may say, in the position that we supply gas all over our district at practically the same price. The average price charged over our 200 square miles, or thereabouts, is 9·06d. per therm, so that it is a little misleading to indicate in the revenue account that we are charging prices as high as 12d. This, however, is the Northfleet figure. The last of the other differential prices will disappear at mid-summer, in accordance with our bargain with the authorities when the various schemes of amalgamation were arranged. Outside Sydenham and Bromley our district is a scattered one, made up of various more or less important places interspersed in large and as yet undeveloped areas. It is our policy to provide business premises in each of the centres in order to give the greatest possible opportunities to our customers for choosing the most up-to-date type of gas consuming devices, and generally facilitating our business relations. We have now altogether eleven of these showrooms, and, as the report tells you, we have acquired additional ones at Orpington and Bexley Heath.

In giving consideration to this matter, it has to be remembered that, whereas in regard to plumbing and wiring the work is generally carried out by local traders, in the case of gas this is not customary. The change had to be made many years ago owing to the trouble in maintaining an adequately high standard in the quality of the apparatus and fitting work required by the consumer. It was then found that the only way to success was to carry out the work ourselves, unless we were content to stand by while bad impressions of the capabilities of gas were given the consumer by his apparatus being unsuited to his needs, or imperfectly fitted to his premises.

From time to time we see in the newspapers reference to geysers for supplying hot water for baths having been fitted up in a very, I must say, dangerous manner by some local plumber, who is either without the necessary knowledge, or else is face to face with a demand by the consumer that he should do the work at a very unremunerative price.

Monthly Accounts.

Our system of quarterly account rendering was discontinued at the Christmas quarter, and we are now posting accounts monthly. This change of procedure was only adopted after the change had been working sufficiently long in our larger neighbour's case to enable us to form a judgment of its possibilities. In that case it has certainly fulfilled its expectations, for it has completely done away with that fruitful cause of grievance on the part of gas consumers arising out of what are known as complaints of charge. The winter and the spring quarters used to bring about an epidemic of these cases, and many of these resulted in a request by the consumer to take away his recently installed gas fires or other appliances on the ground of their unexpected costliness in working. The new arrangement has also eliminated another of our former troubles, namely, those in respect of stopped or non-registering meters. Like clocks, these are liable to cease working, and therefore, indicating, and when this happens some average figure has to be taken as the equivalent of the unrecorded gas. Then, in many cases, the consumer says that he was away during the quarter in question and did not burn any gas at all. The process of adjustment was never a popular one with the consumer, and its inconveniences have largely disappeared with monthly checking. On the whole I am hopeful that there cannot be a serious difference between the experiences in our area and that of our neighbour in this respect; the two areas are contiguous, and there is no reason to doubt that in the long run, when the people get used to the change, they will derive the benefits from it which we anticipate, and our relations with the consumers—which, after all, constitutes more than anything else our goodwill—will be constantly improving.

Bye-Products.

As regards bye-products, in the case of our most important one, coke, we have shared with other undertakings the improved demand for this commodity. The average price obtained was a good one, but we hope to see in the current year a larger yield. In tar, we have not done so badly and the price which slumped during the summer, now shows signs of hardening, I am glad to say. Its use for road-making continues a very popular and valuable outlet. Our most disappointing residual is ammonia which at one time figured for substantial amounts on the revenue side of our account. This year it figures for only £761, which is a very insignificant figure. The production of synthetic ammonia has been increased very largely, and practically every civilized country, instead of relying upon either ammonia or nitrate for that particular form of fertilizer, is now making its own synthetic ammonia. France, Italy, Sweden, Norway, and Germany are all busy, with plants driven by water power or steam power, just as we are at Billingham extracting nitrogen from the atmosphere and making it into ammonia. The prospect with regard to ammonia, therefore, does not look very promising. The most hopeful thing I can say is that I do not think it can get any worse. At any rate, we are not in the same unfortunate position that some undertakings are which have to extract ammonia at a loss. Ammonia has always been regarded as an impurity in gas. You all know sufficiently the qualities of ammonia to be able to judge how far that reputation is a sound one, but, at any rate, it has to be extracted from the gas.

Increase in Calorific Value.

We have given notice of our intention to increase the thermal value of our gas from 500 to 560 B.Th.U., and this should result in a substantial saving in distribution costs, which must be normally heavy in an area so widespread as is our district of supply. The question as to the most desirable form in which gas should be distributed must be answered differently in each case in accordance with the different conditions, but in the case of a large area such as ours there is no doubt whatever that, provided we can make heat units in a concentrated form as economically as we can make them in a less concentrated form, and if we can distribute them in the more concentrated form, we shall in the long run save in respect of meters, and—more important still—in respect of mains and services. We shall make the change in May, when the notice expires. Perhaps that change may have some effect, too, on the unaccounted-for gas, which is one of the uncertainties of our business, and which at the present moment does not compare quite as well as we should like with our neighbours.

Co-Partnership.

I must not omit to mention the co-partnership, which continues its admirable work of harmonizing the interests of employer and employed, both of whom have to look to the consumer for their provision. Whatever our troubles, the attitude of our staff, whether monthly or weekly, is always a helpful one, and there is no doubt whatever that the educational training in good citizenship brought about by co-partnership has a widespread influence for good.

Coal Mines Bill.

Before I sit down I must say a word about the Coal Mines Bill now being considered by a Committee of Parliament. It is divided into two parts, the second of which deals generally with hours. We all know too much of the conditions of mining to grudge those employed in the industry the fruits of their efforts over many years to improve their working conditions by a modification of hours. But the first part of the Bill contains some very startling provisions which, as one deeply interested in obtaining coal at a fair market price, I should be very sorry to see pass into law. It is proposed to bring into being a body called the Coal Commissioners (and as far as one can see from the discussions in the House of Commons, it looks as though the proposal with regard to the appointment of that body has been agreed upon already), the extent of whose staff and duties may be imagined when I tell you that the cost is expected to be a quarter of a million pounds sterling per annum. Their duties may be shortly described as bringing about amalgamations, with or against the will of the parties concerned, when it thinks a group of two or more separate undertakings should be formed into one large unit. There are collieries with which we have done business for a good many years—one of them a few weeks ago paid a dividend of 7½ p.ct.—and it seems very unfortunate that a well-managed colliery should be compelled to associate itself with one which has not been well managed. What the full effect will be I do not know, but I am afraid it will mean inevitably that the price of gas will be raised. Then there is the other unfortunate procedure by which, supposing the demand for coal falls off, both the economically-worked and the uneconomically-worked mines will have to reduce their output, instead of the output of the uneconomically-worked mine being reduced and the economically-worked mine being allowed to keep going as before. I am afraid I have not an unlimited belief in the efficiency of unlimited amalgamations, and certainly not enough to welcome a scheme whereby the well-managed well-paying collieries should be hampered with the burden of ill-equipped and dearly-worked ones. One would have thought that the powers exercised by the Electricity Commissioners, by which the extravagant power stations for electric generating are to be shut down and their work taken up by the super stations, would be a more effective procedure. But the very opposite is contemplated. Lastly, it is proposed to pay a subsidy upon export coal, the money for which is to be obtained by taxing the coal consumer at home. This seems worse than robbing Peter to pay Paul, and it would be better to describe as taking out of John's pocket something to give to X—that is, the British coal consumer and the foreign buyer.

We are told that as monopolists we can easily pass on the added costs to the gas consumer. Politicians make much political capital

out of what they call an untaxed breakfast. But where does the logic or the justice come in of taxing the almost universal means of cooking it—*i.e.*, by gas? We all realize that the present Parliament was elected on a pledge to settle the question of the miners' hours. I sincerely hope that even at the eleventh hour they may be content with that and to leave the coal mining industry to reorganize itself, to improve its own technology and selling methods, and carry out the work with the aid of its own people, without the aid of civil servants and these extra people who are going to be incorporated for this particular purpose. At the same time, I sincerely hope—because labour troubles have been at the bottom of a good deal of their difficulties for many years—that they will include some scheme of co-partnership as between the capitalists in the coal mining industry and their employees.

I now formally move that the Report of the Directors, and the Accounts examined and signed by the Auditors, be received, adopted, and the Report entered upon the Minutes.

Mr. B. R. GREEN (Deputy-Chairman) seconded the resolution.

DISCUSSION OF THE REPORT.

Mr. W. K. SCOTT asked for enlightenment with regard to the amount of gas unaccounted-for, for it appeared that there had been a 10 p.ct. loss in distribution. Discussing showrooms, he said he had been interested in gas companies, directly or indirectly, all his life, and as he went into and out of town he had noticed one characteristic of gas companies' showrooms, and that was that they were extremely badly set out. He had never yet seen one which compared favourably with the showroom of the electric supply company in his district, but he did hope—though he was sure the South Suburban Company would pay due attention to this matter without any remarks he might make—that the Company would lay out its showrooms much better than other gas companies throughout the land. The gas industry would not be able to persuade people to buy its goods unless it placed those goods before them in an attractive manner. Again, some gas companies had a scheme—which he considered was very much overdue in some cases—whereby appliances were examined from time to time. That was most important, and perhaps the South Suburban Company had such a scheme. If a gas appliance were not working as it should do, the fault was not always that of the fitter. After all, fittings did get out of order in time. He considered the time had come when gas companies should examine the various appliances and come to a conclusion in each case as to whether it would not be worth while to replace an old appliance by a new one. In his own house he had had a gas fire replaced by another, and the results were extraordinary. If the gas industry was to compete with almost a subsidized institution it ought to try to keep itself up-to-date, and try to persuade the users of gas fires, for example, to change their old ones, which might even be dangerous, for modern ones.

The CHAIRMAN, replying, said he was very sympathetic indeed with Mr. Scott's remarks. In the first place, he said, perhaps the gas industry suffered from the handicap that it was an old-established industry; it was more than a hundred years since the gas industry was first established, and it was only comparatively lately that those concerned with the manufacture of gas had been impressed with the importance of cultivating the selling side. He believed that the great bulk of those interested in the economic manufacture of gas had not as a rule been greatly blessed with what he might call the "shopkeeping instinct." A gas manager might be a very good one so far as manufacturing was concerned; he might understand how to obtain the best yield of gas from his coal and the best bye-products, but when it came to understanding the very remarkable psychology of the person, male or female, who had money and had to be tempted to spend it, the average manager was the last person in the world, generally speaking, to deal with that problem. Like Mr. Scott, he had been very disappointed from time to time, to say the very least, at the curious and weird displays that he saw so frequently in gas companies' showrooms. He did not wish to praise the South Suburban Company's officials unduly, but it was fortunate in having as its Commercial Manager a gentleman who had not only some very valuable instincts as to the importance of the economic production of gas, but who had also a large share of that commercial or shopkeeping instinct. If any of the proprietors of the Company were passing through that part of the Company's area which contained its showrooms they would be able to see—though they might not be completely satisfied—that a very great deal had been done to place those showrooms on something like a par, at least, with those of electricity supply undertakings and others who had articles to sell. The Bromley showroom was quite an interesting one, and he did not think it looked at all like the average gas showroom. The Company were attaching more and more importance to this problem. It was realized that it had to understand what was passing in the consumer's mind, and what he wanted what attracted him, and not what the Company thought he ought to have.

He was also very sympathetic with Mr. Scott's remarks concerning the inspection of appliances, and would not be surprised if the Committee which was lately appointed to consider matters pertaining to the general use of gas recommended that it should be the duty of the Company to make some systematic inspection of appliances.

He was bound to admit that the percentage of unaccounted-for gas did not compare as well as the Directors would like with that in other undertakings in the neighbourhood. How far that was really loss, or how far it was unrecorded gas, he was not sure, but there were one or two matters which bore upon it. First, there was the question of the tightness of the mains and services, and secondly, the condition of meters. The condition of the meters was a matter of very great importance, and the Company was attaching much more importance to the purchase and manufacture of meters which would stand up to the requirements without misbehaving themselves as regards consumption than had been the case at one time. He was assured by the officials, and had every reason to believe it, that they were paying particular attention to the testing of meters and putting them in order, because it was obvious that if there were any hesitancy on the part of the meter to register the full amount of gas going through it, that was a fruitful source of bad working results. As to the mains, he pointed out that the Company's area was a large one, and quite recently he had been turning over in his mind what he regarded as the inadequacy of the present system of comparing leakage. There should not be, and he believed generally there was not, any hesitancy on the part of gas undertakers to compare to the fullest extent their own working with that of their neighbours. They were all to some extent in competition with their neighbours as regards the prices of residuals, but as regards the business of gas supply generally, each was working within its own definite area, beyond which it could not go; and therefore it could afford, without placing itself in an uncommercial position, to disclose and discuss its working with its neighbours. He had reason to believe that the problem of leakage, or unaccounted-for gas, was one which had occupied, and was likely to occupy still in the future, an important place in the minds of those responsible for gas undertakings. What gas undertakers had lacked in the past was a true method of comparison. The one on which they usually relied—*i.e.*, the main mileage leakage, based on a definite quantity of gas sold, was not a very accurate one. Those statistics should all be reduced to a common denominator—say, of a pipe 12 in. in diameter. If the whole of the systems of mains were reduced to a common denominator of that kind and compared on that basis, then gas undertakers would know better which was really leakage and which was unaccounted-for gas. The unaccounted-for gas recorded by one of the Company's neighbours was about 1½ p.ct., and if the Company could reduce their figure from 9·06 to 1½ p.ct., the Company would improve very substantially its working results.

The resolution for the adoption of the Report and Accounts was put to the meeting and carried.

DIVIDENDS.

The CHAIRMAN moved the following resolution:

> That a dividend for the half-year ended Dec. 31 last be now declared at the following rate per annum—viz., 6½ p.ct. on the Ordinary Stock, less income-tax; and that warrants for the net amounts be forwarded on the 27th inst. to the registered addresses of the Proprietors.

Mr. BENJAMIN R. GREEN (Deputy-Chairman) seconded, and the resolution was carried.

RE-ELECTION OF DIRECTORS.

Mr. FRANK JONES proposed the re-election of Mr. Benjamin R. Green and Mr. Harold Gundry, the retiring Directors. He pointed out that Mr. Green was Deputy-Chairman, and that Mr. Gundry was the next senior Director, and he proposed their re-election with great pleasure.

Mr. A. M. PADDON, who seconded, said that both Mr. Green and Mr. Gundry had had very long experience and possessed complete conservancy with the duties of administration. In their own interests the proprietors could not do better than re-appoint these two Directors.

The resolution was carried unanimously.

RE-ELECTION OF AUDITOR.

On the motion of Mr. C. P. CROOKENDEN, seconded by Mr. ERNEST A. PIERCE, Mr. Alfred Morland was unanimously re-elected an Auditor of the Company.

VOTE OF THANKS TO THE CHAIRMAN AND DIRECTORS.

On the motion of Mr. C. P. CROOKENDEN, seconded by Mr. ERNEST A. PIERCE, a hearty vote of thanks was accorded the Chairman and the Directors for their services.

The CHAIRMAN, responding, assured the meeting that it was a great reward for himself and his colleagues to know that the proprietors appreciated their efforts.

VOTE OF THANKS TO THE STAFF.

The CHAIRMAN, proposing a vote of thanks to the staff, said that the business of gas supply became more and more complicated year by year, and the strain upon the staff increased as time passed. The Company was served admirably, both by the commercial staff, headed by Mr. Wastell, and by the technical staff, headed by Mr. Terrace, and he would like the proprietors to have an opportunity to express their appreciation of the services of the employees.

The vote of thanks was carried with acclamation.

Mr. WILFRID WASTELL, F.C.I.S. (Commercial Manager and Secretary), responding on behalf of the commercial staff, said that the last few months of last year had not been easy, owing to the radical change made in connection with the rendering of accounts. Even in his most pessimistic moments he had not expected that it would involve such a vast amount of work, and to those who were directly responsible for the actual work in connection with it the whole of the credit was due.

Mr. JOHN TERRACE (Chief Engineer), responding on behalf of the technical staff, paid a tribute to the workpeople, without whose efforts, he said, the whole of his work would be of little avail, and he was glad of the opportunity to tell the proprietors how much the prosperity of the Company was in the minds of the whole of the workpeople in its employ, and how ready they were at all times to do their best to help it forward. He was also seconded by a very efficient and willing technical staff, and with their help, and that of the workpeople, the Company would do in the future at any rate not less well than it had done in the past.

This concluded the business of the meeting.

Wandsworth, Wimbledon, and Epsom District Gas Company.

Annual General Meeting.

The Annual Ordinary General Meeting of this Company was held on Tuesday, Feb. 11, at Cannon Street Hotel, London—Mr. FRANK H. JONES (Chairman of the Company) presiding.

The notice convening the meeting was read by the SECRETARY (Mr. W. H. Cromarty), and the register of stockholders was sealed.

The Directors' Report and Statement of Accounts for the year ended Dec. 31, 1929, were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN said that, as was shown by the figures and the report, the year under review had been one of some progress and of some success. To add nearly 3000 new customers to the 91,000 existing on Jan. 1, 1929, to have a 4½ p.ct. increase in the sale of gas during the year, to have an additional 6600 appliances of different kinds using gas, and to have laid over 20 miles of mains, he hoped would satisfy the meeting that the staff had done their work efficiently and well.

As was stated in the report, the Bill giving the Company further powers, of which he had informed the shareholders a year ago, had become an Act of Parliament, and he was glad to say that during its travel from the Company's extraordinary meeting, held last February, until it received the Royal Assent last summer, there was practically no alteration in it. That was very gratifying to all of those who had been responsible for its inception. From Jan. 1 this year the sliding-scale had ceased to govern the Company's selling price and dividends. A basic price and tripartite division of profits was to be made, and the new system should add to the prosperity of the Company. The consumer, the stockholder, and the worker were each very closely interested in the economical working of the undertaking; and the system encouraged economy and efficiency much more than the old sliding-scale could. He had received a letter from a shareholder suggesting that perhaps it was not a wise thing. The writer was not present at the meeting, but he (the Chairman) would reply to the letter and explain certain advantages which the Board believed to exist in the basic price system.

THE NEW ACT.

Referring further to the Company's new Act, he said that during the last 10 or 12 years the most thought-of and discussed point in the Board Room had been the question of the large number of the Company's stocks and classes of loan cupital. Many of them had thought that the difficulties were great, and that they might not be able to overcome them, but he was glad to say that to-day, with the help of an eminent firm of chartered accountants—Messrs. Deloitte, Plender, Griffiths, & Co.—and of the staff, the Company had only one consolidated stock, one preference stock, and one debenture stock, so that when one saw a quotation of Wandsworth stock one would know what it meant. He was afraid that it had not always been so easily understood.

In accordance with the terms of the new Act, the price of gas in the Wimbledon area was reduced, and the permanent differential price in that area was now nearer to that applying in the Wandsworth area. That was done because the growth of the Wimbledon area was so great that the Board felt it was not quite fair to have a big differential price always existing between the two areas, and Parliament had approved of that.

Discussing one or two of the items in the printed report, he said that in the first place it would be noticed that the words "and Managing Director" had been added to his title after the word "Chairman." This had been done by the Board to enable him to carry out his work to the greater advantage of the Company. He also recalled that last year he had said that there was to be a change in the Secretarial office. Mr. Braine, who had served the Company well and long, was in retirement, and his place had been filled by Mr. W. H. Cromarty, who had spent practically all his working life in the service of the Company; he (the Chairman) and his fellow Directors were quite confident that Mr. Cromarty's appointment would satisfy the requirements of the shareholders and themselves in the future. ["Hear, hear."]

The report also announced the death of one of the Company's auditors, Mr. Willis Smith, who had been the auditor of the old Mitcham Company. He was sorry to say that Mr. Smith had died suddenly a few weeks ago. When the Directors had heard of his death they had thought it prudent to ask another accountant to help Mr. E. L. Burton in his work of auditing the accounts. Mr. Burton was the only really qualified auditor the Company had ever had. The Directors had asked Mr. Bernard Hennell to help in this work, and his election would be proposed and seconded. Already he had helped Mr. Burton in his work. It would be remembered that a year or two ago the shareholders had kindly increased the auditors' fees, but, as one of the auditors was a qualified accountant and the other was not, the whole of the increase in fees had been given to the qualified accountant. When that increase was agreed to, he (the Chairman) had stated that if at any time the unqualified auditor should discontinue his office—and he was sorry that that had occurred, particularly in view of the circumstances—he would ask the shareholders to appoint a qualified accountant and to sanction another increase in the fees similar to the increase sanctioned previously. If it were the wish and pleasure of the shareholders to elect Mr. Hennell, then he would ask them to sanction another increase of £100 per annum, so that the two qualified auditors would be paid alike. Mr. Hennell was a qualified accountant, and lived in the Company's area. He had audited the pension funds for some years, and knew a good deal about the Company. His father had been one of the auditors of the old Wandsworth Gas Company.

AMALGAMATION WITH KINGSTON-UPON-THAMES.

Lastly, continued the Chairman, the report mentioned the reason for the extraordinary general meeting which would follow the ordinary meeting. At that extraordinary general meeting there would be explained, and the shareholders would be asked to sanction, an amalgamation between this Company and the Kingston-upon-Thames Gas Company. If the shareholders were satisfied and approved the agreement the Company had made with its neighbour, it would have two definite advantages, which he would mention, besides others. The consumers of gas in the Kingston area would at once get a reduction in the price of gas, and he hoped and believed that the addition of this new business would help to cheapen the cost of the production of gas in the whole area. ["Hear, hear."] If the Board and management did not believe this, he would not be asking for the shareholders' approval of the scheme. Amalgamation merely to make a big company was, to his mind, foolish; but when amalgamation led to economies and a reduction in the price of gas, then he was all for it, because cheap gas was still, as it ever had been, the very life-blood of this Company and of the gas industry. If and when that fact was forgotten by the Directors and management, the Company would fall upon very evil days. Sometimes he saw signs—and he was almost going to say he had seen them frequently—that the "cheap gas" slogan of men such as Livesey, Woodall, his father (Mr. Harry Jones), and many others who had had much to do with the building up of this great industry was rather apt to be forgotten. Some people might think that he was rather foolish in his advocacy of cheap gas; but he emphasized that the company which tried to sell gas cheaply would succeed much more easily than one which did not try; he advised the shareholders, if and when he showed signs of carelessness in regard to this very basic and fundamental principle, to get a new Chairman, and he said it with all sincerity.

Discussing the salient points of the accounts, he said that no capital had been raised during the past year. The capital expended had been increased by a net £88,913. The gross expenditure during the year was £812,000, against £821,000 in the previous year. Receipts for gas were up, but the receipts for rentals of stoves, meters, &c., were down, owing to certain adjustments of charges having been made. The Company's charges for the hire of meters and stoves had sometimes been criticized; but the Directors had always watched them very carefully. They had made certain reductions, and had brought the charges for all the various apparatus into line, so that like was charged for like. The Company's charges to-day might appear to be somewhat higher than those of some other companies; but, as the Board saw it, they could not charge less, because they had to pay interest on capital, and had to pay for repairs and many other things.

RESIDUALS.

The one bad point in the accounts was that of residuals. The receipts for residuals were down by £22,000, and that was the only thing that had worried him when he had first seen the figures. But for that drop—and a lot of it, he was sorry to say, was in respect of tar—the Company would have had a wonderful balance-sheet. He was glad to say, however, that it looked as though the position in regard to some of the residuals was going to be a little better this year.

Every provision had been made for the proper upkeep of the undertaking. Nearly £6000 had been placed to the special purposes fund, and depreciation of the proper items had been provided for. An amount of some £25,000 a year for depreciation of stoves and meters was the first allowance that had to be made out of the Company's earnings. When all this was done, the shareholders would see that something over £13,000 had had to be taken out of the carry-forward in order to pay the full dividend. He had received a letter from a shareholder, and, in his reply, he had called attention to the fact that, when selling gas as cheaply as the Company did, it was impossible to estimate year by year what the exact figures would be. Twice during the past four years there had been a surplus—*i.e.*, the Company had made more profits than it had wanted for all its capital charges, and twice there had been a deficit; but during those four years, £140,000 odd had been written off for depreciation; £38,000 had been added to the special purposes fund, increasing that from under £2000 to £39,000; and the carry-forward to this year's account was £16,700, as against £7687 four years ago, after having taken off the amount required to make up the dividend. The cheaper the price at which gas was sold, the less one had to play with. It must be remembered that the Company was in a more difficult position than most companies, because very nearly half of the gas sold was 1d. per therm cheaper than any of its neighbours. There was one Company in the North of London which sold gas more cheaply than the Wandsworth Company did, so that he could not say that the Wandsworth Company's gas was the cheapest in London. It was because of the low price of gas in the Company's area that it was not easy always to have a big fluid balance. There was no need to be anxious about that, however.

NEW OFFICES AT WANDSWORTH.

The Company had made very great improvements in the office accommodation at Wandsworth, and the staff, or at any rate many of them, were working in healthier and more congenial surround-

ings than heretofore. There was a staff dining room, which filled a long-felt want. He lunched there occasionally, and could testify to its great utility and the good value which the staff obtained for their money. It was run by the staff and not the Company, and the catering part of it was self-supporting.

A new showroom was being built at Merton Road, so that the total number of the Company's showrooms was six. During the past year there had been a large increase in business at the showrooms of the Company, and the consumers were making more and more use of them for the payment of accounts. That had great advantages, because not only did it save the Company the task of collection, but the consumers saw in the showrooms all kinds of up-to-date apparatus and wanted it installed in their own homes.

In 1929, the British Commercial Gas Association (of which he was President) had held its annual Conference at Eastbourne. He had been asked to be President of that Association because he was the Chairman of the Wandsworth Company; but the Duke and Duchess of York had intimated that they were going to Eastbourne, and as he happened to be connected with the Eastbourne Gas Company, Eastbourne was thought to be a more reasonable place than perhaps Wimbledon or Epsom for the holding of the Conference. The Duke and Duchess of York had honoured the Conference by their presence there, and the Eastbourne Company had joined with the Wandsworth Company in acting as hosts to the delegates of the Association. The Board of the Wandsworth Company had been very kind and had said that they would incur the expense, and they hoped the shareholders approved of it. The expense was not very great, however. Those who were qualified to judge had told him that the Conference had been a success, and that those who had attended, and perhaps others also, had benefited by it.

TRIBUTE TO THE STAFF.

In a tribute to the staff, the Chairman emphasized how much the Company and the Directors owed to all the employees. He saw a great deal of the employees, so that he could speak of what he really knew. There were 1800 employees, 1548 being on the pension fund, and 1335 were profit sharers, who together owned £108,000 of the Company's ordinary stock—*i.e.*, over one-tenth. [Cheers.] The Secretary had a large number of proxies from them, and he was glad that the workpeople had such faith in the Board; it showed that master and man did get on together, and that the staff were satisfied. Incidentally, he mentioned that the stockholders of the Company seemed to have much more faith in their Directors in regard to special business than in regard to ordinary business, for, while they had given him a very large number of proxies for the ordinary business, there were many more, about 10 p.ct., for the extraordinary meeting. Referring again to the staff, he said that the Company was served well by all the employees, from the General Manager downwards, and most of the staff were young, energetic, and capable. Though a vote of thanks to the members of the staff would be proposed at a later stage, he wished the shareholders to appreciate to the full what the staff was doing for the Company and the consumers.

In conjunction with the Wandsworth Borough Council, a demonstration of modern and improved gas lighting of streets was being made, about one mile of thoroughfare being experimented with, and he had very little doubt that the results would be of benefit to wayfarers by night and in foggy weather. Under the Trade Facilities Act, the Company had obtained a loan of £205,000, free of interest for three years, and this money would be expended at once. It would assist in curing the great evil of unemployment; it would not have been spent ordinarily until a few years hence; but it was being spent on work which would have to be carried out some day soon to meet the rapidly growing demands which would be made for gas in view of the large amount of building projected in the more southern parts of the Company's area.

The adoption of the report and accounts was seconded by Mr. R. GARRAWAY RICE (Deputy-Chairman), and, there being no response to the Chairman's invitation to the shareholders to ask questions, the motion was carried.

DECLARATION OF DIVIDENDS.

The CHAIRMAN proposed that dividends for the half-year to Dec. 31, 1929, be declared as follows: On the 5 p.ct. preference stock, 5 p.ct.; on the Wandsworth "A" stock, 9 p.ct.; on the Wandsworth "B" stock, 7½ p.ct.; on the Wandsworth "C" stock, £6 6s. p.ct.; on the Wimbledon stock, £7 2s. 6d. p.ct.; on the Epsom stock, £7 12s. 6d. p.ct.; and on the new ordinary stock, £6 6s. p.ct.—all rates per annum, *less* income-tax.

The proposal was seconded and carried.

RE-ELECTION OF RETIRING DIRECTORS.

On the motion of the CHAIRMAN, seconded by Mr. R. M. CHART, the retiring Directors, Messrs. T. A. Ives Howell and G. F. Page, were unanimously re-elected.

ELECTION OF AUDITORS.

Mr. J. C. POTTER proposed that Mr. E. L. Burton, F.S.A.A., be re-elected, and Mr. B. Hennell, F.C.A., be elected, Auditors of the Company, at a remuneration of £400, to be divided equally between them. Mr. Potter added that he was glad that the Company had secured the services of two professional auditors.

The resolution was seconded by Mr. O. B. GREEN, and carried unanimously.

Mr. BURTON, in returning thanks for his re-election, said how much he welcomed Mr. Hennell as co-auditor, because hitherto, inasmuch as his colleague was not a qualified accountant, the whole load of the work had been on his shoulders. As the result of Mr. Hennell's election, his (Mr. Burton's) duties could be practically halved. He felt he had been doing double work for single pay. [Laughter.]

Mr. HENNELL, who also returned thanks for his election, recalled that he had been auditor 18 years ago, just before the amalgamation, but, as junior, he had had to retire.

VOTE OF THANKS TO THE STAFF.

The CHAIRMAN proposed a cordial vote of thanks to all in the service of the Company, and said that no Company was better served than this by the staff. By chance, the members of the staff were very young, with few exceptions; he had the opportunity of meeting the majority of the senior members of the staff, and their chief aim in life was to serve the Company. He wanted all members of the staff, from the General Manger downwards, to know that the shareholders did appreciate the manner in which they worked for the Company.

Mr. B. R. GREEN, who seconded, said he did so with sympathy because he himself had been through the mill and knew something of what the employees were called upon to do. Many of them had worked with him in the old days, and it was a great pleasure to watch their development. He added that he wished it were his province to propose a vote of thanks to the Chairman, because he knew what great work the Chairman performed for the Company; but he knew that there were others who wanted the opportunity to propose it.

The vote of thanks to the staff was carried with acclamation.

Mr. C. M. CROFT (Chief Engineer and General Manager), responding, assured the meeting of the hearty co-operation of the staff, and said he would have great pleasure in conveying to all the vote of thanks that had been passed.

This concluded the business of the ordinary general meeting.

EXTRAORDINARY GENERAL MEETING.

An Extraordinary General Meeting was then held for the purpose of considering the agreement which has been entered into for the amalgamation of the Company's undertaking and the Kingston-upon-Thames Gas Company's undertaking, and of approving it.

The SECRETARY (Mr. W. H. Cromarty) read the notice convening the meeting.

The CHAIRMAN said that the reason for the amalgamation was that the Directors of the Company had acquired some years ago a very large area of land on the River Thames at Wandsworth. He was not exaggerating when he said that the works on that land, situated as it was on the Thames, and with access by sea to the coalfields of the North, from which coal was obtained in the Company's own ships, produced gas as cheaply as did any gas-works on the Thames. Whenever one went to this site one always asked why more of the land was not used for gas-works, seeing that gas could be produced there so cheaply. The past Directors of the Company, who had acquired the land, had been very wise in that action, and the Company could make gas on that land at a price which would enable them to sell gas in Kingston more cheaply than it could be sold there at present. The areas of supply of the Kingston and the Wandsworth Companies were contiguous for a distance of ten miles, and the existing mains were such that it would be perfectly easy for the Wandsworth Company to make gas in its present area and supply in the Kingston area. In order to be sure that the price agreed upon for the Kingston undertaking was the proper price, the Companies had submitted it to Messrs. Deloitte, Plender, Griffiths, & Co. (Chartered Accountants), and that firm had approved it, and were prepared to support it when the inquiry was held by the Board of Trade before it sanctioned the amalgamation.

Mr. ARTHUR J. LEES (Messrs. Lees & Co., Parliamentary Agents) read the provisions of the agreement made between the Wandsworth and Kingston Companies, and which, if approved, would be embodied in an application for a Special Order under the Gas Undertakings Acts, 1920 and 1929.

The CHAIRMAN said that the Kingston Company's shareholders had unanimously passed resolutions a week previously in support of the amalgamation.

On the motion of the CHAIRMAN, seconded by Mr. R. GARRAWAY RICE (Deputy-Chairman), the meeting passed the two resolutions, which are similar to those already passed by the Kingston Company. The first expressed approval of the provisional agreement dated Dec. 6, 1929, between the Kingston Company and the Wandsworth Company for the amalgamation of the undertakings; the second authorized the promotion of a Special Order, for which application is being made to the Board of Trade under the Gas Undertakings Acts, 1920 and 1929, to give effect to the agreement, and to increase the borrowing powers of, and to confer further powers upon, the Company.

Mrs. BUNNEY asked when the values of the Wandsworth Company's stocks, which had been consolidated, were taken.

The CHAIRMAN replied that the values of the old stocks were fixed last September twelvemonth.

Mrs. BUNNEY said that when railway stocks had been consolidated some years ago, the holders had lost considerably, not because of reduction of dividends, but by the reduction of the capital itself.

The CHAIRMAN said that it was hoped that in the case of the Wandsworth Company's stock, of whatever class, there would be no change in the actual capital value; indeed it was hoped that its value would be increased by reason of the consolidation. He assured all shareholders that the income to be derived in the future on the consolidated stock would not be less than they would have obtained on the old stock if it had not been consolidated, and that the value of the stock on the market would not be depreciated by reason of consolidation.

Mrs. BUNNEY said she had asked her first question because there had been a slump on the Stock Exchange at the end of 1929, and she had wondered whether the values of the Wandsworth stocks had been taken at that time.

The CHAIRMAN replied that had had no effect whatever.

Mr. ALDERMAN SCOTT said he was not surprised that the Directors had received more proxies for this special meeting than for the ordinary meeting, because he had realized, and apparently others

had, what a fine bargain the Wandsworth Company had made with the Kingston Company. With regard to the rearrangement of the Company's capital, he asked what would be the amount of the debentures, of preference stock, and of ordinary consolidated stock after the amalgamation, because so much of the intrinsic value of the preference stock depended on the amount of consolidated or ordinary stock.

The CHAIRMAN said that the capital of the amalgamated Company would be roughly £1,800,000. That figure included the ordinary and preference stock, but not debentures; the preference stock would amount to nearly £400,000.

Mr. E. L. BURTON said that, as a shareholder, he welcomed the fusion which had been approved, because he could not help thinking that the standing charges of the two undertakings would be greatly reduced, and that the reduction in the price of gas would be tremendously to the advantage of the Companies and the consumers.

VOTE OF THANKS TO THE DIRECTORS.

Mr. E. L. BURTON, proposing a vote of thanks to the Chairman and Directors for their conduct of the Company's business, said that the shareholders were convinced that they were served by a very able body of Directors and a particularly able Chairman—the able son of an able father.

The vote of thanks was seconded by Mr. CLIFTON SHERRARD (who is a Director of the Kingston Company), and carried with acclamation.

The CHAIRMAN briefly responded; and this concluded the business of the meeting.

Croydon Gas Company.

The Annual Ordinary General Meeting of the Croydon Gas Company was held at the Company's Offices, Katherine Street, Croydon, on Friday, Feb. 14—Mr. WILLIAM CASH, J.P., F.C.A. (the Chairman), presiding.

The SECRETARY (Mr. Frank F. Wood) read the notice convening the meeting and the minutes of the annual general meeting held on Feb. 15, 1929. The Directors' report and statement of accounts for the year ended Dec. 31, 1929, were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN expressed the hope that all the proprietors would agree that the accounts for 1929 were very satisfactory, both as to the general financial position of the Company and also as to the business of the Company during the past year.

Referring to the accounts he first called attention to the capital account from which it would be seen that the Company was on the right side. During the past year there had been two issues of new capital. The first was £75,000 5 p.ct. debenture stock, which was issued at a net price to the Company of 97, and produced the amount shown in the accounts. The second was £50,000 maximum dividend stock issued at 85 locally, and the fact that this issue was over-applied for and that a certain amount of money had to be returned was evidence of the regard in which the Company was held locally both by its consumers and the public. Further, this issue had the advantage that it brought in quite a number of new shareholders, the average allotment being under £150.

On the expenditure side of the accounts it would be seen that a considerable sum had necessarily been spent during the past year in view of the continued growth of the business. They had erected a new set of intermittent vertical retorts capable of manufacturing 3¼ million c.ft. of gas per day, and it was interesting to note that this plant was replacing, on the same site, an old plant whose capacity was only one million c.ft. of gas per day. The type of plant selected was adopted after very careful inquiry both at home and abroad. Associated with this new plant was a coal and coke handling equipment which he was convinced would prove very advantageous to the Company and effect considerable savings. The Engineer and Directors were very pleased with the plant so far, and it was believed that it would prove very efficient. In connection with the new carbonizing plant was certain ancillary plant which would have a capacity of dealing with 4 million c.ft. of gas per day.

Continuing the Company's policy with regard to showrooms, new showrooms had been opened during the year at Caterham. The old showrooms at Caterham were very small and inadequate for the Company's requirements; but the new premises were in an excellent situation just outside the railway station. It was also hoped that new showrooms at Wallington would be opened in March, and it was believed that these would be the finest and most complete showrooms, for their size, anywhere in the neighbourhood of London. In connection with these new premises, a tribute was due to the work of the Company's architect, Mr. A. Douglas Robinson, who had been responsible in both cases. As a justification of the showroom policy that was being adopted, it was interesting to mention that the showrooms' sales last year amounted to £70,000, while, in addition, a large amount of work had been done in consumers' premises. For new consumers during the year the Company had equipped 15,752 points for gas. A total of 2900 new services had been added, while the number of consumers had increased by 3417. In addition to all this, they had sold outright or on hire purchase some 13,000 appliances, and the Distribution Department had dealt with 160,248 orders during the year.

NEW STOVE SHOPS.

There was a reference in the report to the new stove shops at Purley Way. These were situated in an existing factory which had been acquired, and the alterations that had been made had rendered the premises very suitable for the work to be undertaken there, which consisted of stove repairs, enamelling, and testing appliances. Provision was also being made for a stores, and ultimately a central garage for the Company's fleet of vehicles would be constructed. In addition, facilities would be provided there for training the Company's fitters, which was regarded as very important work indeed. His colleagues on the Board had paid him the compliment, which he appreciated very highly, of calling these workshops the William Cash Workshops, and he could only hope they would prove the advantage to the Company that he believed they would. These shops were now open and had been taken over by the Stove Department on Feb. 2. The old stove shops at Waddon were being converted to other uses, which were very much required in the present congested state of the blacksmiths' shops and stores at Waddon.

When he addressed the shareholders a year previously, continued Mr. Cash, the climatic conditions were exceptionally cold, and it so happened that a year ago almost to the day—Feb. 15—they had their record day, the output at Waddon being 16 million c.ft.—an increase of over 62 p.ct. as compared with the same day of the preceding year.

On the past year as a whole there had been the very satisfactory increase of 6½ p.ct., or 170 million c.ft. of gas sold, and it was a source of satisfaction to the Board that the exceptional demands of the year had been fully met. The officers and staff rose to the occasion and produced all the gas that was necessary to meet the complete demands of the consumers. In all these circumstances it was not surprising that further works extensions were in contemplation and actually in progress to some extent.

Apart from the capital expenditure on new plant it was necessary to spend considerable sums on the districts in order to give the best service to the consumers. Last year, some 13 miles of new mains were laid, and about 8 miles of mains were enlarged or replaced. As a result of all this it would be seen that the amount standing in revenue account in regard to this expenditure was very high. On the other hand, it would be appreciated that there was going on in their district, as was the case all over the country, a considerable number of street widenings and conditionings, and these were increasing the burden on the Company so far as expense was concerned, because the opening and reinstatement of modern roads was a very costly matter. Reverting to new plant at the works, the Chairman mentioned that two sets of automatic C.W.G. plant were to be installed having a capacity of 6 million c.ft. per day, and when this plant was completed the capacity of the works would be about 20 million c.ft. per day.

ESTATE DEVELOPMENT.

The Chairman then passed to the matter of estate development in the Company's area, and the manner in which gas was being supplied to them. In the area of the Croydon Gas Company, he said, there was a total of 23 estates being developed by the Corporation of Croydon, the London County Council, the Carshalton U.D.C., the Beddington and Wallington U.D.C., the Coulsdon and Purley U.D.C., the Godstone R.D.C., and the Caterham and Warlingham U.D.C. These estates comprise altogether some 2957 houses, and in them the Company had installed no fewer than 2841 gas cookers, 2369 gas coppers, and 488 gas fires. Gas lighting was provided in 12 out of the 23 estates. In two cases of flats built by the Croydon Corporation —not included in the above figures—special gas fire flues had been incorporated in the buildings, and in one case all the tenements had one or more built-in gas grates. Gas wash-coppers had also been fitted in these buildings. These figures related to building estates being developed by local authorities, but there were also estates being developed privately in the Company's district. Croham Heights, which was being developed by Messrs. Richard Costain & Sons, Ltd., was one of the largest, and on Jan. 1, 1930, comprised 614 houses ranging in price from £800 to £2000 each. Everyone of these houses was equipped with a gas cooker, a gas copper, and at least one gas fire, and the majority of them also had either gas-heated circulators or coke boilers in use. This brief survey of estate development in the Company's area proved that gas was certainly required in modern houses and buildings, and that it was not excluded by reason of competition from other forms of heat and light.

There were two special matters referred to in the report which were somewhat exceptional—viz., the re-assessment of the Company's property under the Rating and Valuation Act, and the revision of their statutory powers with regard to the standard price. Both these matters had been dealt with by the authorities and the Company had no complaint to make in any sense. He was, indeed, happy to say that both matters had been settled by agreement without legal expense, both sides being anxious for a fair settlement. The local authorities in both instances were advised by experts, and an agreement was arrived at. So far as the rates were concerned, it would be observed in the revenue account that there was the substantial increase of £5400 in the account as actually paid for rates; but that was not the full burden which would fall on the Company, because the new assessment was only operative from April 1, 1929. It should not, however, be forgotten that the previous assessment had been standing for a number of years and had not been altered recently. Therefore, the Directors did not think it unreasonable to expect an increase.

NEW STANDARD PRICE.

With regard to the position as to the standard price, the new standard price on which the sliding scale dividend was calculated, was 14·8d. per therm, which was an increase over the original pre-war

standard of only some 34½ p.ct. In the June, 1929, half-year, when the new standard was not applicable, they were able to transfer £7000 to reserve, that being approximately the amount which was not distributed as dividend in respect of that half-year. In the second half of the year, the statutory dividend was being paid, calculated on the revised standard price. In the half-year now current, with gas at 9d. per therm, the authorized dividend would be £7 2s. 6d., the Company having the alternative of paying the existing dividend of 7 p.ct. only and carrying the remaining 2s. 6d. p.ct. to reserve.

From the net revenue account it would be seen that the position and results of the past year's operations were extremely satisfactory. Reserve fund had been credited with £7000—which was all the Company was authorized to do—compared with £10,000 a year ago. The Company was continuing its policy of building up a pension fund, and was adding another £10,000 as a special contribution, as was done in 1928, while £10,000 had been transferred to renewal fund, again as was done in 1928. Further than that, the amount to be carried forward after paying dividends for the second half-year would be £34,220, which compared with £23,078 in 1929, so that they had added to the carry-forward the sum of £11,142. If the amounts contributed to pensions fund, reserve fund, renewals fund, and the carry-forward were treated as reserve, or as additions to the general financial position, it meant that the financial position had been improved to the extent of £38,143, and enabled payment of the full statutory dividend of 7 p.ct. These figures were sufficient justification for the remarks he had made at the opening of his speech that the accounts were to be regarded as extremely satisfactory.

In turning to the general balance sheet, it would be observed that the pensions fund continued to grow, and now stood at £220,000, of which £149,475 were invested, the net increase for the year being £31,718. The date was rapidly approaching when an actuarial valuation would be due again, and he hoped the actuary would feel that his advice having been followed, the fund would be found actuarially in a sound position.

FURTHER OUTLOOK.

Speaking on the outlook for the current year, the Chairman remarked that gas for heating was a very important part of the business, and the weather affected that part of the business considerably. The weather this year so far had been very different from what it was last year at the same period; but it was too early to say yet what the full results for the year were likely to be. Last year the spring was very cold, and the summer was very hot, and for the moment there had been nothing like the increase in the sales of gas for the current half-year, as far as it had gone, as was the case last year. That, however, was a matter which greatly depended upon the weather.

THE COAL BILL.

The Chairman, continuing, said he would not be expected to sit down without saying a few words with regard to the question of coal. The Coal Bill now before Parliament naturally caused the Directors some anxiety. It would appear from the discussions that had taken place that some increase in the price of coal must admittedly result if the Bill was passed with the provisions which were at present contemplated in it. The gas industry was particularly concerned, because one object of the Bill appeared to be to differentiate between classes of coal consumers, and there seemed to be an inclination to single out the public utility undertakings on the ground that they were in the position to pass any increase in the cost of coal on to their consumers. The railway companies and the gas companies had been specifically mentioned in this connection. The fact must not be lost sight of, however, that gas companies have limited dividends dependent upon the price of gas, and, in that sense, any burden which was added must fall upon the consumers. Throughout the whole country there were some 9 million consumers of gas, or between 35 and 40 million people. In one sense any addition to the cost of gas must mean an addition to the cost of food having regard to the large use of gas for cooking, and it did seem to some of those concerned with the industry that if these proposals were persisted in, the large body of gas consumers and voters might have something to say. The Board decided, in view of the position as it was to-day to reduce the price of gas again this year—on Jan. 1—by 0·2d. per therm. As the report stated, the price of gas was reduced, having in mind the fact that coal cost something less in 1929 than in 1928, and these price reductions to consumers were equivalent to £16,900. At the moment, the Company was protected by coal contracts which would no doubt be fulfilled. They were contracts made between a willing buyer and a willing seller, and he could not believe that there would be any disturbance during the period of those contracts. They were not as a Company nor as an industry politicians, but they looked with anxiety on interference by legislation with industry. Imagine for one moment if the proposals in the Coal Bill now before Parliament related to corn instead of coal, and a direct burden was to be placed on food to assist (say) the position of agriculture and agricultural labour? He suggested that no party would touch such a proposal to raise prices and add to the cost of living of the home consumer and give a subsidy for export which might assist the foreigner. Gas shareholders and gas consumers sympathized with the difficulties of the coal industry, but they most anxiously hoped that the Coal Bill might be so amended as not to cast a burden on other industries and particularly might not single out the great and important gas industry, so as to add a disproportionate burden on its shoulders and, through the industry, on to its shareholders.

The Chairman concluded by moving:

> That the report and statement of accounts for the year ended Dec. 31, 1929, be, and the same are hereby, adopted with the exception of the paragraphs relating to the declaration of dividends, the election of Directors and an Auditor, which are to be considered separately.

Mr. THOMAS RIGBY (Deputy-Chairman) formally seconded the resolution.

Lieut.-Col. J. H. BORROSTON, C.B., O.B.E., referring to the maintenance of appliances in consumers' premises, said he found, as one who did a great deal of reading and writing at night, that gas was infinitely preferable to electric lighting on account of the effect of the latter upon the eyesight, and he had an installation of gas lighting with switches near the door, which gave him all the conveniences of electric lighting and all the comforts of gas lighting. He had never had the slightest trouble with this installation. In conclusion, he paid a tribute to the courtesy and salesmanship ability of the staffs at the Company's showrooms, and congratulated the Company on the excellent premises that had been established.

Captain HETHERINGTON expressed the view that the fall in the quantity of gas unaccounted-for during 1929 was evidence of keenness on the part of the staff.

The CHAIRMAN said the Board recognized how important was the question of leakage and unaccounted-for gas, and had noted with satisfaction the reduction in the figures for the past year. Col. Borroston, who had recently come as a consumer into the district, had had considerable experience with gas undertakings, and his own personal views as to the advantage of gas lighting from the point of view of eyesight coincided with those of Col. Borroston. He also thanked the Colonel for his complimentary remarks with regard to the Company's showrooms and showroom staff.

The report and accounts were then put to the meeting and unanimously adopted.

DECLARATION OF DIVIDENDS.

The CHAIRMAN next moved:

> That dividends at the following rates per annum for the half-year ended Dec. 31, 1929:
>
> 7½ p.ct. on the preference stock;
> 5 p.ct. on the maximum dividend stock;
> 5 p.ct. on the maximum dividend stock, issued during the half-year, from date of allotment;
> 7 p.ct. on the sliding scale stock;
>
> making, with the interim dividends declared by the Directors, and paid on Sept. 1, dividends for the year at the respective rates of 7½ p.ct., 5 p.ct., and 7 p.ct., be now declared and payable on March 31.

Mr. HENRY WOODALL, seconding the resolution, said that, having taken a special interest in the equipment of the works side of the business, he could say that the undertaking was well equipped and well managed, and an examination of the accounts showed that from year to year the cost of manufacturing gas was getting lower and lower. This was very largely due to the improvements in the plant and equipment and to good management on the part of Mr. Grogono, their Engineer, and his predecessor.

The resolution was carried unanimously.

RE-ELECTION OF DIRECTORS AND AUDITOR.

On the motion of Mr. THOMAS RIGBY (Deputy-Chairman), seconded by Mr. CHARLES HUSSEY, Mr. William Cash was unanimously re-elected Chairman of the Company, he being one of the three Directors who retired by rotation. The other two retiring Directors, Mr. Percy Hedley Hall and Mr. Guy Savory, were unaimously re-elected.

Mr. Frederick Sloman was unanimously re-elected an auditor of the Company.

The CHAIRMAN, proposing the usual vote of thanks to the officers and staff for their work during the past year, referred first to the General Manager, Mr. Sandeman, whose abilities and qualifications were such that there were other people who would like to obtain his services; but Mr. Sandeman was remaining at Croydon. In their Engineer, Mr. Grogono, also they had one of the best qualified in the industry. Mr. Grogono had come to the Croydon Company from the Gas Light and Coke Company with the highest credentials, and everything that had been said about him before he joined the Company had been amply fulfilled. Their Engineer was now engaged in the installation of the new plant, and it was an important thing for the Company to have at its command the technical services of a man so qualified. The other senior officer of the Company was Mr. Wood, the Secretary, who was not only a very able Secretary, but also an excellent accountant. Mr. Wood had been responsible for the important reorganization that had been going on in the internal management of the business. Under these three capable senior officers were many other officers and also the general body of workpeople whose work during the past year the Board sincerely appreciated and of whom they were proud. The co-partnership scheme was a real live one in Croydon, and was of the greatest benefit both to the workpeople and to the Company. The Company could not earn its dividends if it were not for the loyal work of the staff generally, and it was no mere idle compliment that he asked the meeting to pass a hearty vote of thanks to the officers and staff for their work during the past year.

Mr. WARREN seconded the motion, which was carried with acclamation.

Mr. WILLIAM J. SANDEMAN (General Manager), who acknowledged the vote of thanks, said he frankly believed that the business of the Company was better at the present time than it had ever been, and that the Company had a great future before it.

Sir ERNEST LAMB, who proposed a vote of thanks to the Chairman and Directors, expressed the view that the public of Croydon was indebted to the Board of Directors for the services they rendered to Croydon and the surrounding districts in the matter of gas supply. As a proprietor, he felt that all the proprietors in the Company were under a debt of obligation to the Board for the manner in which they looked after the interests of the Company and for the eminently successful way in which the business was run. He believed that the successful issue of capital during the past year was due in no small measure to the Board. At the present time investors looked more than ever to the reputation of those with whom they entrusted their money, and he believed that the calibre and integrity of the Board

of Directors led to the results to which the Chairman had alluded in his speech. Referring to the naming of the new Purley Way premises after the Chairman, Sir Ernest said this was but another instance of the smooth and harmonious working that existed between the members of the Board, and the proprietors were indebted to Mr. Cash for allowing his name to be thus permanently associated with the Company.

Captain HETHERINGTON seconded the vote of thanks, which was carried with acclamation.

The CHAIRMAN expressed the appreciation of his colleagues on the Board and himself for the manner in which this vote of thanks had been proposed and seconded and received by the proprietors. He believed the Board had the confidence of the shareholders and also of the public of Croydon. He had been only too pleased that his name should be associated with the Company in connection with the new premises at Purley Way, and it was an additional source of gratification to him that the compliment paid him by the Board in this matter should have been endorsed by the shareholders through the very kind remarks of Sir Ernest Lamb.

The proceedings then closed.

Gas Companies' Results for 1929.

Almost Universally Increased Output.

ABERYSTWYTH.

The balance of profit of the Aberystwyth Gas Company, for the half-year ended Dec. 31, amounts to £2955, out of which the Directors recommend payment of the usual dividends, amounting to £1351, leaving a balance of £1603, out of which amount £1500 is carried to the reduction of the suspense account. Dividends will be paid as follows, *less* income-tax: On the original shares at the rate of £15 p.ct. per annum; on the new shares at the rate of £10 10s. p.ct. per annum; on the preference shares at the rate of £5 p.ct. per annum; on the debenture bonds (interest) at the rate of £4 10s. p.ct. per annum.

BLYTH.

The Directors of the Blyth Gas Company present the following statement of accounts for the year ended Dec. 31, 1929. The revenue amounts to £41,730, and the expenditure to £34,023, leaving a profit on the year's working of £7707. The Directors recommend that a dividend of 3⅞ p.ct., *less* income-tax, on the ordinary stock be paid, making—with the interim dividend paid in August last—£7 15s. p.ct. for the year 1929, and that the balance of £5286 be carried forward to the next account.

BRIDLINGTON.

Speaking at the annual meeting of the shareholders of the Bridlington Gas Company on Feb. 11, the Chairman of the Directors (Mr. J. C. Wentworth) referred to the Government's Coal Bill, saying it would be injurious and was unjust. One of its effects would be to increase the price of gas to consumers, because gas undertakings had no revenue except what they obtained from their customers. He hoped they would use all their influence to prevent the Bill becoming law. Dividends at the usual rates of 17s. per share on the original shares, and 14s. per share on the additional and new capital were passed for the second half of 1929.

BRISTOL.

The 130th ordinary general meeting of the Bristol Gas Company was held on Feb. 13 at the Chief Offices of the Company, Colston Street, Bristol—Sir George E. Davies (Chairman) presiding. In moving the adoption of the report and accounts, the Chairman said: Our output was 4294 million c.ft., an increase of 169 million c.ft. over 1928, which, in its turn, was a record. The number of consumers was 97,828, an increase of 5145 over the previous year, and as illustrating the extent to which gas is used for cooking purposes, we have now in use in the city 86,798 cookers issued by the Company—an increase of 5081 during the year. Ninety per cent. of our consumers have gas cookers issued by the Company. I cannot think of any figures which could more forcibly illustrate the strong position of the gas industry, and the remarkable evidence of the popularity of gas for cooking. Prepayment customers show a continued increase, and now number 51 p.ct. of our total consumers, while their consumption represents 31¼ p.ct. of our total sales, and as emphasizing the importance of this development of our business, I may mention that the total amount collected from slot meters last year was £246,466. A satisfactory feature of the increase in the numbers of consumers during the year is that they include, on existing mains, an addition of 2430, who did not previously use gas, and 2416 (99½ p.ct.) of these had gas cookers installed. In 1920 we had 384 miles of mains in our area. By 1929 we had to lay a further 96 miles, making at the present time a total of 480 miles. Mr. E. C. Taylor seconded the resolution.

CAMBRIDGE.

The annual meeting of the Cambridge University and Town Gas Light Company was held on Feb. 11—Mr. J. Cameron, Chairman of Directors, presiding. In proposing the adoption of the report and accounts, Mr. Cameron said: The figures given show that in the year we made 906 million c.ft., as compared with 852 million in 1928—an increase of 6·3 p.ct., while the figures for 1928 showed an increase of 4¼ p.ct. over 1927. Our business thus continues to grow, and this is further shown by an increase of 495 in the number of consumers, and an increase in the number of appliances sold and fitted during the year, which are as follows: Gas fires, 1367; gas cookers, 529; water heaters, 234—total, 2130. The increase of 6·3 p.ct., however, is not one from which conclusions can be drawn without remembering the circumstances of the year. On the expen-

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No. 658 to 662 Carron Gas Cookers.

GAS COMPANIES' RESULTS (*continued*).

diture side of the accounts there is a sum of £3498 for co-partners, and I take this opportunity of stating the present position of the co-partnership scheme. The number of co-partners is 222, and in the course of the year their holding of stock was increased by £2190 nominal 7 p.ct. stock (the cash value being, of course, greater). The total amount of stock held by them is now nearly £14,000. We have reached the conclusion that it would be necessary in some years' time to lay a high-pressure 12-in. main from the works to Suez Road, then along a portion of the new proposed by-pass road, and so on to Cherryhinton Road, with a still later extension through to the Trumpington Road. The object of this main is to back up the pressure on the south and south-east sides of the town and in Shelford.

CARDIFF.

The annual ordinary meeting of the proprietors of the Cardiff Gas Light and Coke Company was held at the Gas Offices, Bute Terrace, Cardiff, on Thursday, Feb. 13—the Chairman of Directors (Mr. Lawrence G. Williams) presiding. The Chairman, in moving the adoption of the report and statement of accounts, said: We are pleased to report more satisfactory results in the sales of coke. Though the yard price of coke was reduced in December, 1928, from 26s. 8d. to 24s. 6d. per ton, our total revenue from this source has increased, and the average price received per ton is within a few pence of that for 1928. This result is due principally to the efforts made with success to dispose of a larger proportion of our production for local domestic use. The essential of success in this matter is found in using the coke of a size adapted to the conditions existing, and in this direction much good work is being done. It is pleasing to confirm also that gas as an illuminant continues to retain its popularity, and our output of lighting burners during the year amounted to 25,000, including those supplied for the use of coin meter consumers. The demand for gas appliances has also been well maintained, and in particular the number of new cookers sold has been gratifying—a total of £2556 for the year. Including gas fires, radiators, wash-boilers, and water heaters, the total number of appliances sold was 5791. Mr. H. D. Madden, Engineer and Manager, in responding to a vote of thanks to the Officers and staff, said that the whole of the members of the staff and the workers would keenly appreciate what had been said. He had never found any other than an enthusiastic response to all his appeals. This meant a great deal to the executive officers. He referred to research work within the industry, and said that this was proceeding with increasing application. There was probably a hundred times the research work to-day that there was ten years ago. He touched upon the question of the "Infra Red Ray" treatment as an instance of one of the results of this research work. They had a chemical laboratory at Grangetown Works and at Bute Terrace a physical laboratory where consumers' appliances were carefully tested and studied. Referring to the falling off in the revenue from tar, he appealed to local authorities to use Welsh tar, obtained from Welsh coal, for use on Welsh roads. Mr. Auckland (the Secretary) also responded.

NEWPORT.

In thirty years, Mr. George Geen has failed to attend the general meeting of Newport (Mon.) Gas Company only on two occasions, the second of which was the meeting held at the Gas Company's offices on Feb. 10 last. In his absence Lieut.-Col. J. C. Rennie Brewer, J.P., the Deputy-Chairman, presided, and expressed regret at the absence of Mr. Geen through slight indisposition. The Chairman, in proposing the adoption of the Directors' report and statement of accounts for the year ended Dec. 31, 1929, said: "Industrial conditions, to which I referred in February last, have not materially improved in the course of the year, and an exceptionally mild winter has had a restrictive tendency as regards the use of gas for heating purposes. Such factors are calculated to militate against that expansion of business we might reasonably anticipate, but they have also the effect of stimulating our efforts to counteract their unfavourable influence. With it all, you will observe that, after providing for income-tax and depreciation, the profit on the year has met the usual interest charges, and is sufficient to pay the maximum dividend of 5 p.ct. on the consolidated stock. Considerable expense has been involved in laying the necessary mains and services on Maesglas Housing Estate of Newport Corporation, on which 250 tenants up to the present have applied for and received a supply of gas for such limited use as is permitted by the Corporation. In view of this result I think you will agree that we were, virtually, under a public obligation to meet the requirements of this new community, and were justified in authorizing the necessary outlay. The condition of the market for residuals continues to occasion us some anxiety. The position with regard to coke has improved to some extent, but that of tar for the moment has declined. In conclusion, I have again to pay tribute to the ability and zeal of our principal officers, and to their respective staffs, indeed, to the whole of the Company's employees, with whom, I am pleased to say, our relations continue to be satisfactory." Sir Garrod Thomas seconded. Mr. Spittle moved that the final dividend for the half-year ended Dec. 31, 1929, on the consolidated stock of the Company be at the rate of the statutory 5 p.ct. per annum. Mr. Bartlett seconded.

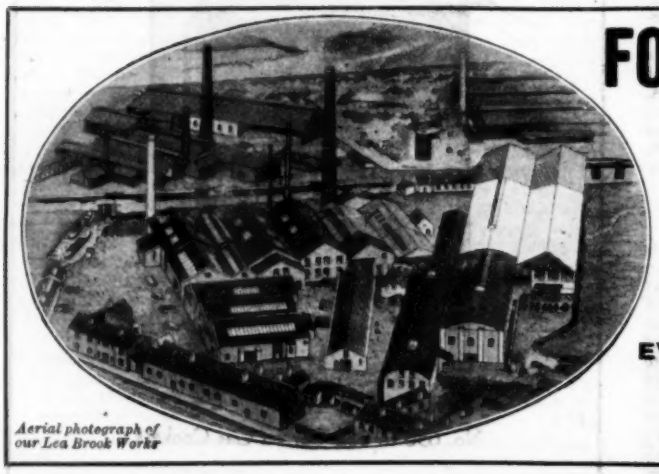
ROCHESTER.

The sales of gas by the Rochester, Chatham, and Gillingham Gas Company for the year show an increase of 37 million c.ft. over the previous year, which is equal to 4 p.ct. New showrooms are being erected at Rainham, and it is hoped they will be completed within a few weeks. A superannuation, &c., scheme in connection with the officials of the Company, to whom the provisions of the National Insurance Acts do not apply, was brought into operation as from Jan. 1, 1929. A dividend at the rate of 6½ p.ct. per annum on the consolidated ordinary stock, *less* income-tax, was paid in August last in regard to the half-year ended June 30, 1929, and the Directors recommend that a dividend at the rate of 6½ p.ct. per annum, on the consolidated ordinary stock, *less* income-tax, for the half-year ended Dec. 31, 1929, be declared.

SCARBOROUGH.

The statement of accounts and balance-sheet of the Scarborough Gas Company for the year ended Dec. 31, 1929, show that the gross profit of £31,431 constitutes a record. As the price of gas during the whole of the year has been 9d. per therm compared with the basic rate of 9·2d. per therm, it is possible to increase the dividend on the ordinary stocks and to inaugurate a profit sharing scheme for the employees. In accordance with the provisions of the Scarborough Gas (Consolidation) Act, 1927, the Directors recommend that the dividend for the year on the ordinary stocks be increased from 5 p.ct. to 5⅛ p.ct., which will account for £2066, that £9 11s. 6d. be carried to reserve fund account, and that the total of these two amounts £2076 5s. be placed to a profit sharing scheme; this amount being one-sixth of £12,457, which was the "consumers' benefit" for the year. The balance standing at credit of net revenue, after taking into account interest charges, interim dividend, &c., is £16,109, and, after providing for final dividend, &c., as per the following statement, there remains a balance of £4208 to carry forward. The statutory interim dividends of 2½ p.ct. on the preference and ordinary stocks were paid in August last, and the final dividends of 2½ p.ct. on the preference stocks and 3⅛ p.ct. on the ordinary stocks will now be payable. The Directors recommend that the amount appropriated for the profit sharing scheme be paid to the employees as a cash bonus in accordance with a scheme to be approved at the ordinary general meeting on Feb. 22, 1930, by virtue of the Scarborough Gas (Consolidation) Act, 1927. The sales of gas for the year reached the record quantity of 635 million c.ft. (2,860,667 therms), showing an increase of 16 million c.ft. (72,466 therms), equal to 2·6 p.ct. over the previous twelve months.

The branch managers of the Halifax Industrial Co-Operative Society last week paid a visit to the Halifax Corporation Gas-Works, where they were met and welcomed by Mr. W. B. McLusky, the Borough Gas Engineer and General Manager. The visitors were divided into three parties and conducted over the works by Mr. McLusky, Mr. Leach, and Mr. W. Heathcote (Sales Manager). The whole process of gas manufacture and distribution was described, and special attention devoted to the developments of the past 20 years in improved working methods.



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STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Feb. 14.	Rise or Fall on Week.	Transactions Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 6	5	5	Aldershot 5 p.c. max. C.	73—78*	..	74
522,992	,,	,,	4	4	Do. 4 p.c. Pref.	70—73*	..	..
1,551,868	,,	Sept. 26	7½	7⅝	Alliance & Dublin Ord.	93—96	..	93½—95½
374,000	,,	Jan. 9	4	4	Do. 4 p.c. Deb.	60—63	..	..
522,655	,,	Aug. 29	7	7	Barnet Ord. 7 p.c.	112—115	..	..
300,000	1	Oct. 24	1/4½	1/4½	Bombay, Ltd.	16/—18/-	..	..
172,500	10	Aug. 29	8½	9	Bournemouth 5 p.c.	13—13½	..	..
500,050	10	,,	7	7	Do. B 7 p.c.	12⅜—12⅝	..	..
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10¾—11⅛	..	11⅛
50,000	Stk.	Dec. 19	3	3	Do. 3 p.c. Deb.	58—56	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	72—75	..	..
357,900	,,	Aug. 29	7½	7½	Brighton & Hove 6 p.c. Con.	113—116	..	..
871,880	,,	,,	6¾	6¾	Do. 5 p.c. Con.	100—103	..	..
1,287,500	,,	July 25	5	5	Bristol 5 p.c. max.	87—88a	..	..
855,000	,,	Sept. 12	7½	7	British Ord.	112—117	..	..
100,000	,,	Dec. 19	7	7	Do. 7 p.c. Pref.	109—114	..	112
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69—71	..	..
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	92—95	..	..
100.000	,,	Jan. 9	5	5	Cambridge 5 p.c. Deb.	88—91	..	..
100.000	10	Dec. 5	8	6	Cape Town, Ltd.	8½—9½	..	..
100.000	10	Nov. 7	4½	4½	Do. 4½ p.c. Pref.	6¾—7½	..	..
150,000	Stk.	Dec. 19	4½	4½	Do. 4½ p.c. Deb.	69—74	..	..
626,860	,,	July 25	6	6	Cardiff Con. Ord.	98—101	..	..
287,860	,,	Jan. 9	7½	7½	Do. 7½ p.c. Red. Deb.	98—101	+1	..
157,150	,,	Aug. 15	6½	5	Chester 5 p.c. Ord.	90—95b	..	..
98.986	1	Oct. 10	‡2/-	‡2/-	Colombo, Ltd. Ord.	34/—36/-	..	..
24.495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	19/—21/-	..	..
375,402	1	Oct. 10	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	20/6—22/6	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	..
2,073,280	Stk.	July 25	7	5	Commercial Ord.	90—95	..	91—91½
475,000	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	54—57	..	..
787,560	,,	Aug. 15	7	7	Croydon sliding scale.	104—107	..	..
453,100	,,	,,	5	5	Do. max. div.	80—85	..	..
542 270	,,	Aug. 29	10	7	Derby Con.	120—125e	..	..
55,000	,,	Dec. 19	4	4	Do. Deb.	67—70e	..	..
209.000	,,	Aug. 29	5	5	East Hull Ord. 5 p.c.	73—75	..	..
1,002,180	10	Sept. 12	†7	†4	European, Ltd.	13—15	..	13½—13½
18,629,125	Stk.	July 25	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	18/6—19/-f	..	18/6—18/10½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	61—63	..	..
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	76—79	..	76½—78
5,602,620	,,	Dec. 19	3	3	Do. 3 p.c. Con. Deb.	57—59	..	57½—58¾
8,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	97—100	..	99½
82,500	,,	Aug. 29	7	7	Hastings & St. L. 5 p.c. Conv.	98—103	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	78—83	..	..
70 600	10	Oct. 10	†10	†10	Hongkong & China, Ltd.	13½—14½	..	..
218,200	Stk.	Aug. 29	6	6½	Hornsey Con. 3½ p.c.	90—93	..	..
1.976,000	,,	Nov. 1	20	10	Imperial Continental Cap.	360—380	..	370—378
228,180	,,	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb.	70—75*	..	75
235,242	,,	Aug. 15	7½	8	Lea Bridge 5 p.c. Ord.	115—118	..	..
2,145,907	,,	Aug. 15	6½	6	Liverpool 5 p.c. Ord.	91—92b	..	..
600.000	,,	Sept. 26	7	7	Do. 7 p.c. Red. Pref.	100½—102½b	..	..
165,736	,,	Aug. 29	8	9	Maidstone 5 p.c. Cap.	122—127	..	..
63,480	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	52—55	..	..
75,000	5	Dec. 5	†10	†10	Malta & Mediterranean	5½—6	..	..
392,000	—	Oct. 1	5½	5½	Metrop'itan (of Melbourne) 5½ p.c. Red. Deb.	92—95	..	..
541,920	Stk.	Nov. 21	†9	†6	Montevideo, Ltd.	107—112	..	109½—109¾
2,061,315	,,	July 25	5⅝	5	Newcastle & Gateshead Con.	16/9—17/8d†	..	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	72—73d	..	..
691,705	,,	Dec. 19	3½	3½	Do. 3½ p.c. Deb.	66½—67½d	..	..
131,780	,,	Aug. 29	7/1/0	7/-	North Middlesex 6 p.c. Con.	112—117	..	116—116½
396,160	,,	Feb. 6	5	5	Northampton 5 p.c. max.	74—77	..	..
300,000	,,	Nov. 21	7	9	Oriental, Ltd.	108—113	..	..
60,000	5	13 My., '15	—	—	Ottoman	0—¼	..	..
205,162	Stk.	Jan. 9	8	8	Plym'th & Stonehouse 5 p.c.	107—110	..	..
424,416	,,	Aug. 29	8½	8	Portsm'th Con. Stk. 4 p.c. Std	113—118	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	80—83	..	..
2,334,464	1	June 27	—	15	Primitiva Ord.	28/—30/-	-/6	..
244,500	100	Dec. 3	4	4	Do. 4 p.c. Red. Deb.	92—95	..	..
695,000	Stk.	Jan. 23	4	4	Do. 4 p.c. Red. Deb. 1911	77—80*	..	79—79½
416.345	,,	Dec. 19	4	4	Do. 4 p.c. Cons. Deb.	77—80	..	79—79⅝
150,000	10	Sept. 26	6	6	San Paulo 6 p.c. Pref.	8⅝—9½	..	9⅛
1,736,968	Stk.	Aug. 29	6½	6½	Sheffield Cons.	105—107e	+1	..
95,000	,,	Jan. 9	4	4	Do. 4 p.c. Deb.	76—78e	..	..
90,000	10	June 13	‡4	‡4	South African	4—6	..	..
6,709,895	Stk.	July 26	7½	5	South Met. Ord.	100—102	..	100½—101½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	107—109	..	..
1,895,445	,,	Jan. 9	3	3	Do. 3 p.c. Deb.	55—58	+1	56
734,000	,,	Sept. 12	6½	6½	Do. 6½ p.c. Red. Db.	99—101	..	101
91,500	,,	Aug. 15	8½	8½	South Shields Con.	109—111d	..	..
1,543,795	,,	July 25	6½	6½	South Suburban Ord. 5 p.c.	101—104	..	101—101½
468,837	,,	Dec. 19	5	5	Do. 5 p.c. Deb.	92—95	..	..
647,740	,,	Aug. 15	5	5	Southampton Ord. 5 p.c. max.	77—80	..	..
121,275	,,	Dec. 19	4	4	Do. 4 p.c. Deb.	69—72	..	..
179,014	,,	July 25	8	8	Sutton Ord.	116—119	..	..
67,828	,,	Jan. 9	5	5	Do. 5 p.c. Deb.	91—94	+3	..
250,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
200,000	,,	Dec. 19	6½	6½	Do. 6½ p.c. Red. Deb.	99—101	..	..
1,076,490	,,	Aug. 15	6⅝	6⅝	Tottenham District Ord.	101—106	..	103½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
199,005	,,	Dec. 5	4	4	Do. 4 p.c. Deb.	72—75	..	..
182,380	10	30 Dec., '12	—	—	Tuscan, Ltd.	3½—4½	..	..
85,701	Stk.	Sept. 26	6	6	Uxbridge, Maidenhead, & Wycombe 5 p.c.	97—102	..	99—100
309,094	,,	Aug. 29	7	7	Do. 5 p.c. pref.	85—90	..	..
88,330	,,	,,	5	5	Wandsworth, Wimbledon, and Epsom Cons.	105—110	..	..
1,180,970	,,	—	—	—	Do. 5 p.c. Pref.	87—92	..	..
200,000	,,	July 11	5	5	Do. 5 p.c. Deb.	91—95	..	..
488,344	,,	Dec. 19	5	5				

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H. G. HARDS, A.C.I.S.,
Secretary.

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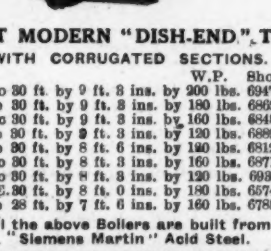

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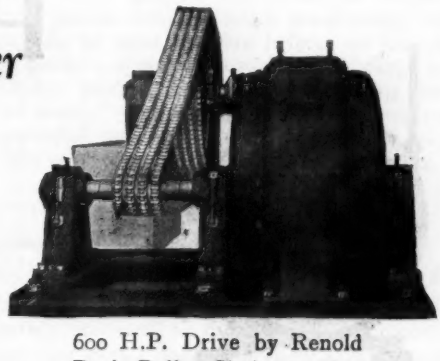

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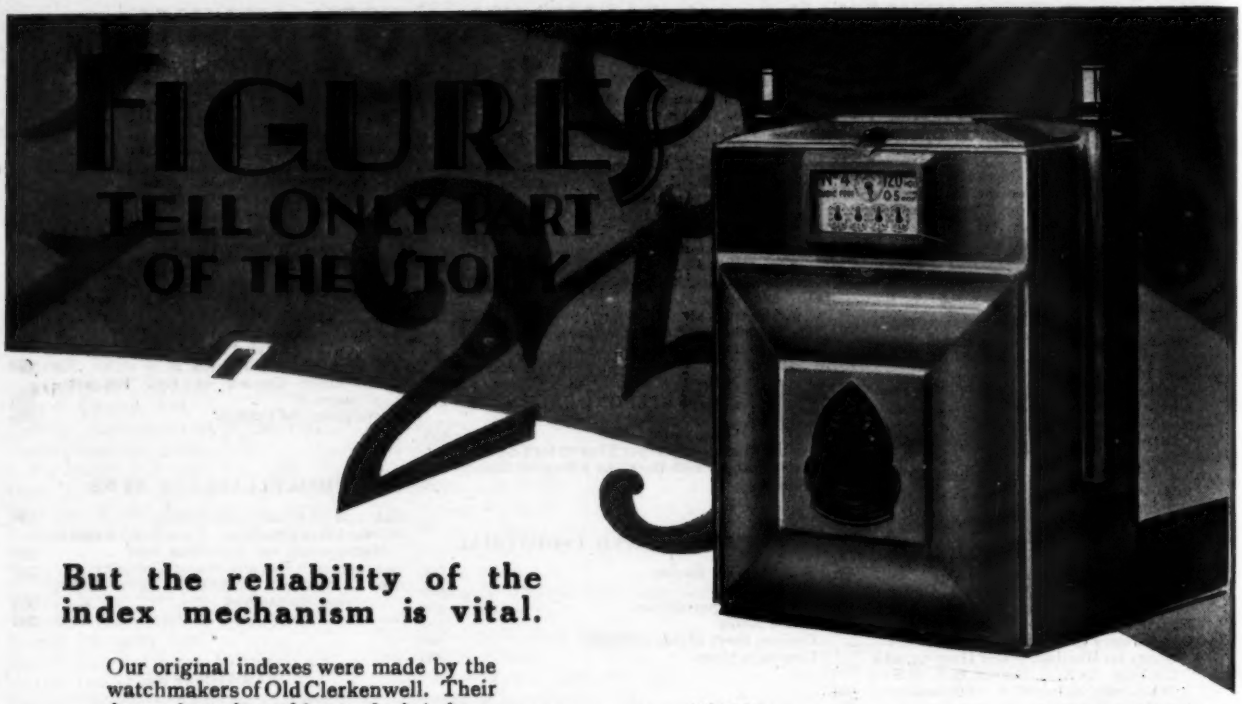

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